US008105389B2

(12) United States Patent
Berelsman et al.

(10) Patent No.: US 8,105,389 B2
(45) Date of Patent: Jan. 31, 2012

(54) **METHOD AND APPARATUS FOR WRIST ARTHROPLASTY**

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(73) Assignee: **Biomet Manufacturing Corp.**, Warsaw, IN (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **12/389,919**

(22) Filed: **Feb. 20, 2009**

(65) **Prior Publication Data**

US 2009/0204224 A1 Aug. 13, 2009

Related U.S. Application Data

(63) Continuation-in-part of application No. 11/867,884, filed on Oct. 5, 2007, which is a continuation-in-part of application No. 11/517,537, filed on Sep. 7, 2006, which is a continuation-in-part of application No. 11/260,729, filed on Oct. 27, 2005, which is a continuation-in-part of application No. 10/862,821, filed on Jun. 7, 2004, now Pat. No. 7,766,970, which is a continuation-in-part of application No. 10/279,240, filed on Oct. 24, 2002, now Pat. No. 6,746,486.

(51) **Int. Cl.**
A61F 2/42 (2006.01)

(52) **U.S. Cl.** **623/21.12**

(58) **Field of Classification Search** 623/21.11–21.14
See application file for complete search history.

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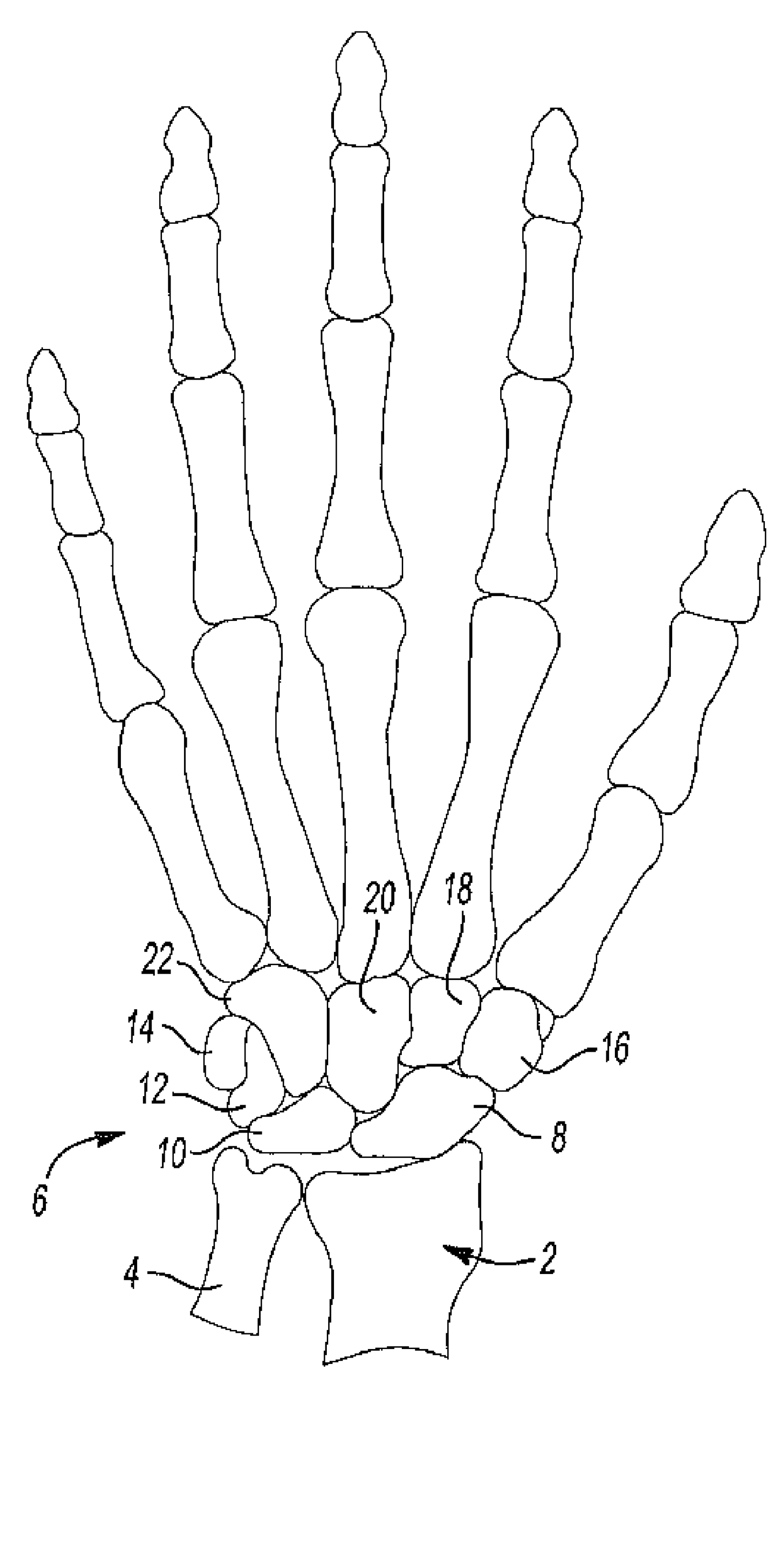
Primary Examiner — David Isabella
Assistant Examiner — Ann Schillinger
(74) *Attorney, Agent, or Firm* — Harness, Dickey

(57) **ABSTRACT**

A wrist prosthesis system to replace at least a portion of a bone of a wrist of a patient. The system includes a carpal implant to replace at least a portion of a carpal bone of a carpal complex of the patient. The carpal implant includes a base and an augment that replaces at least a portion of the carpal bone. The augment is removably coupled to the base.

9 Claims, 42 Drawing Sheets



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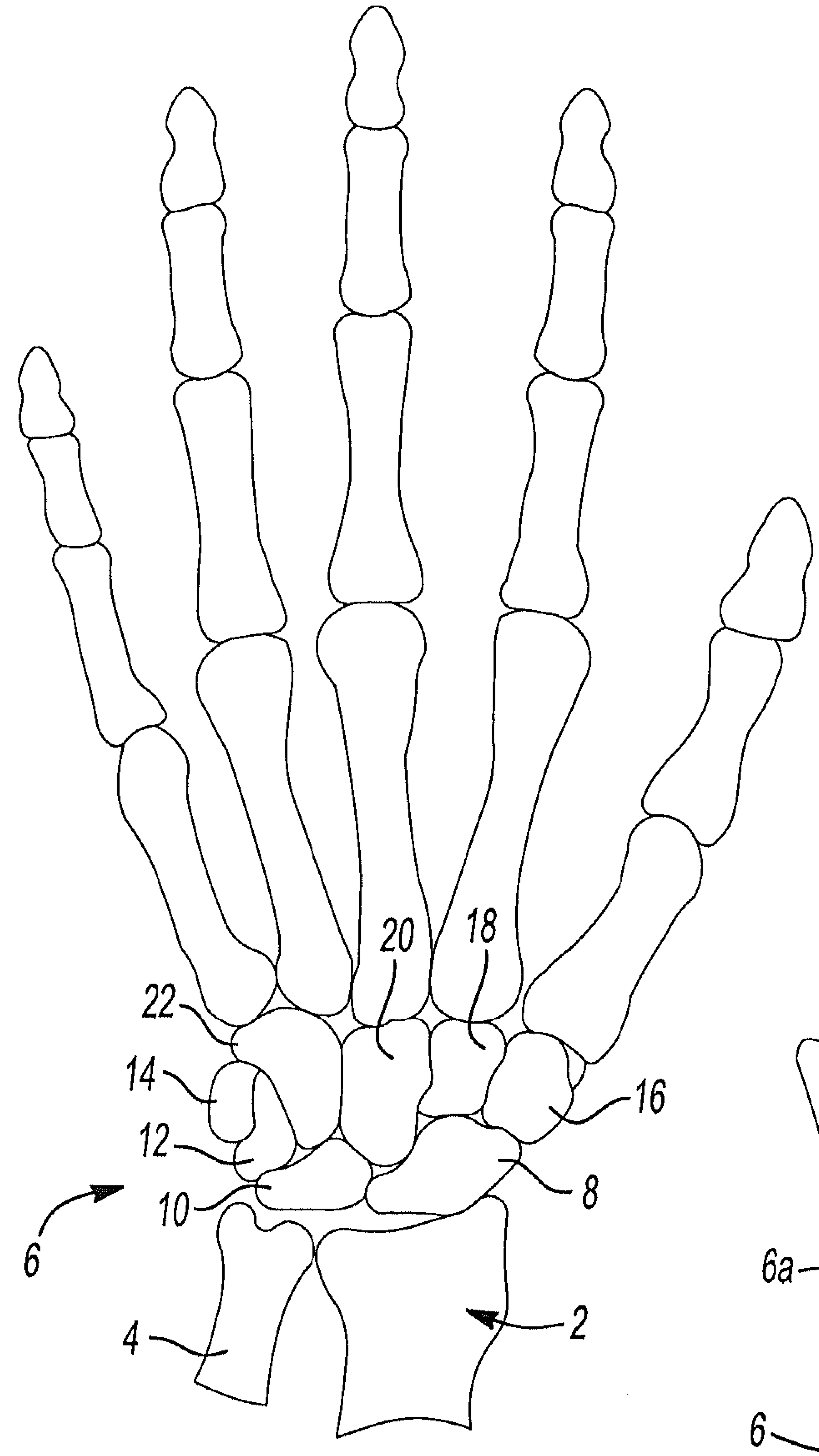

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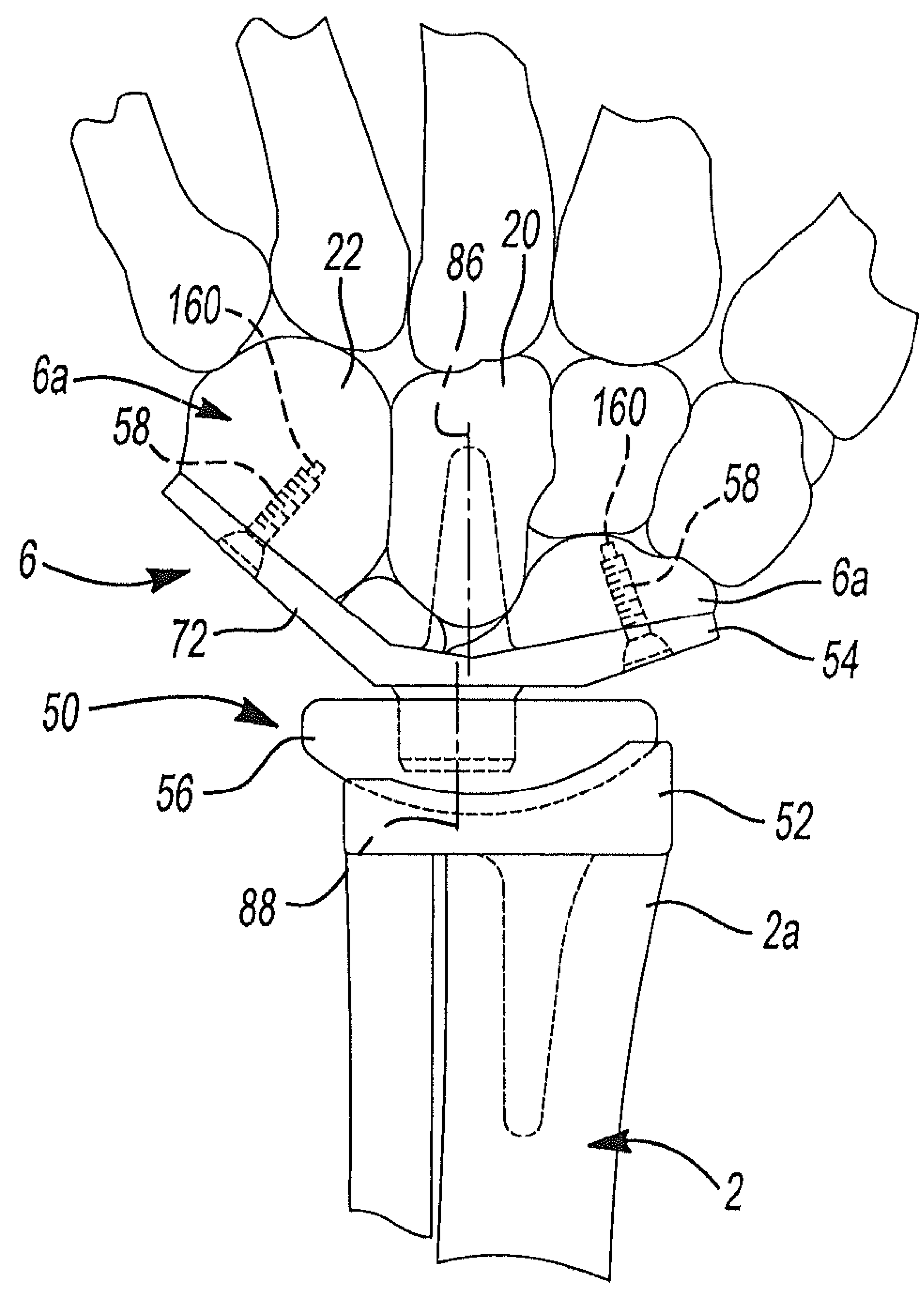

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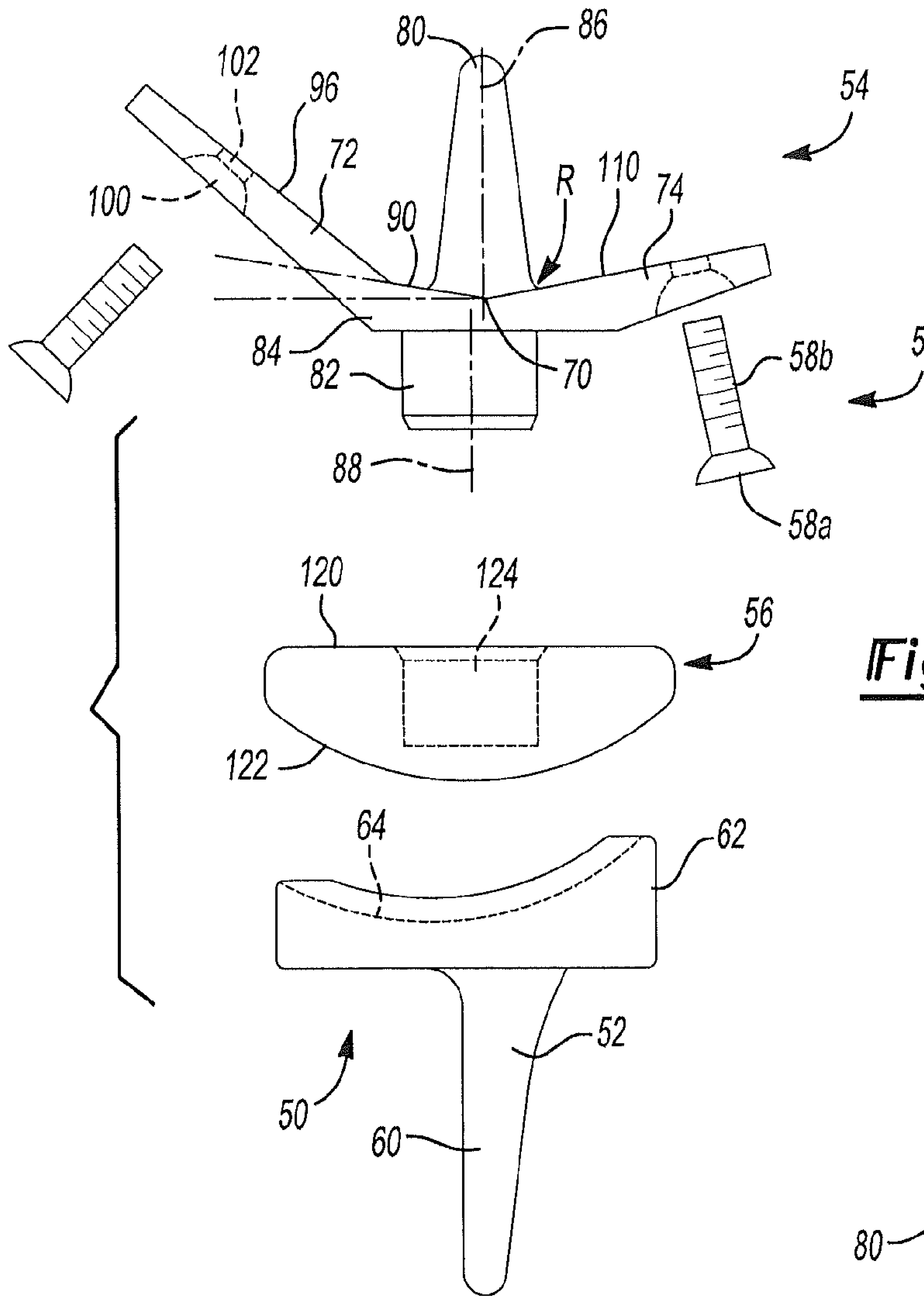
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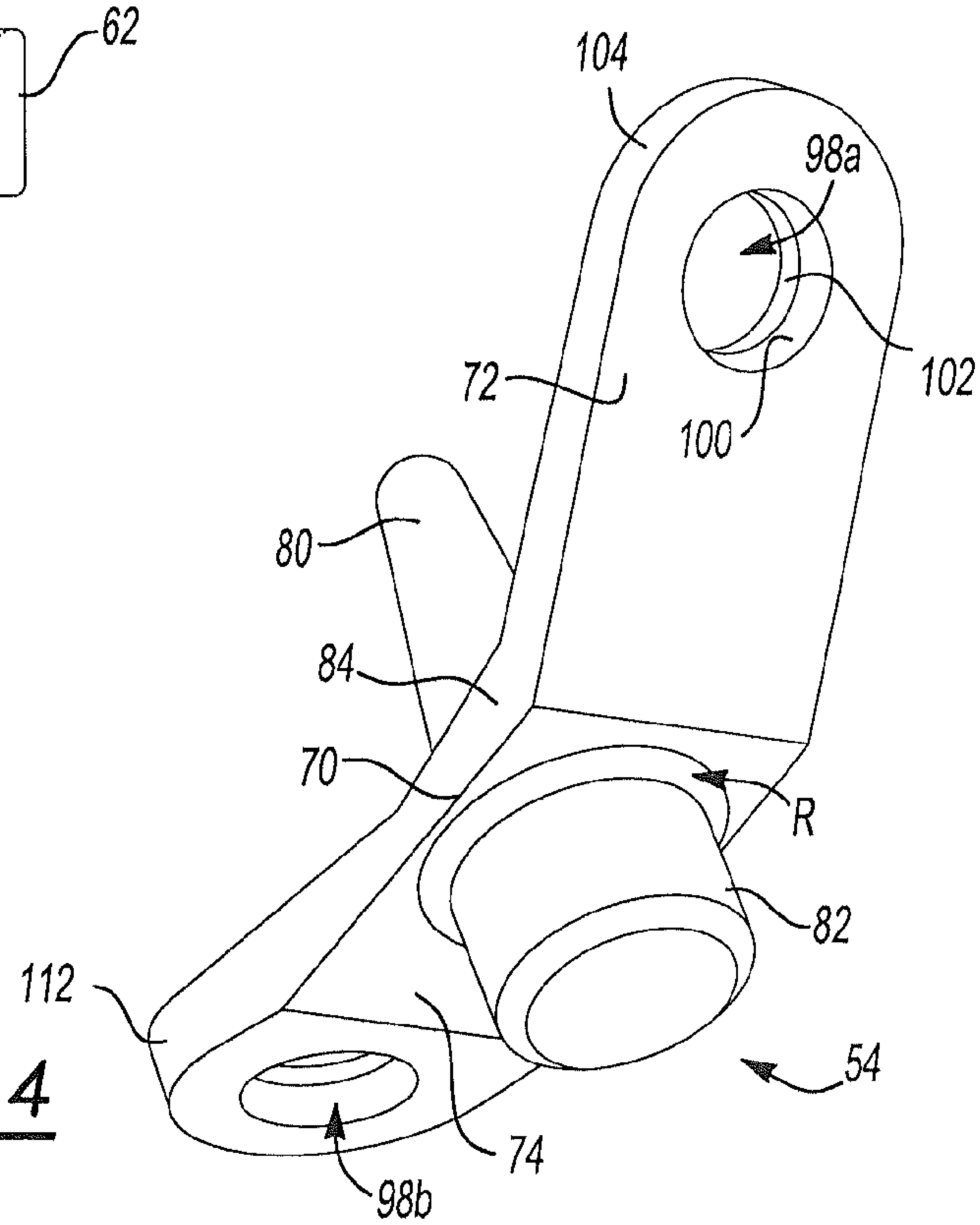
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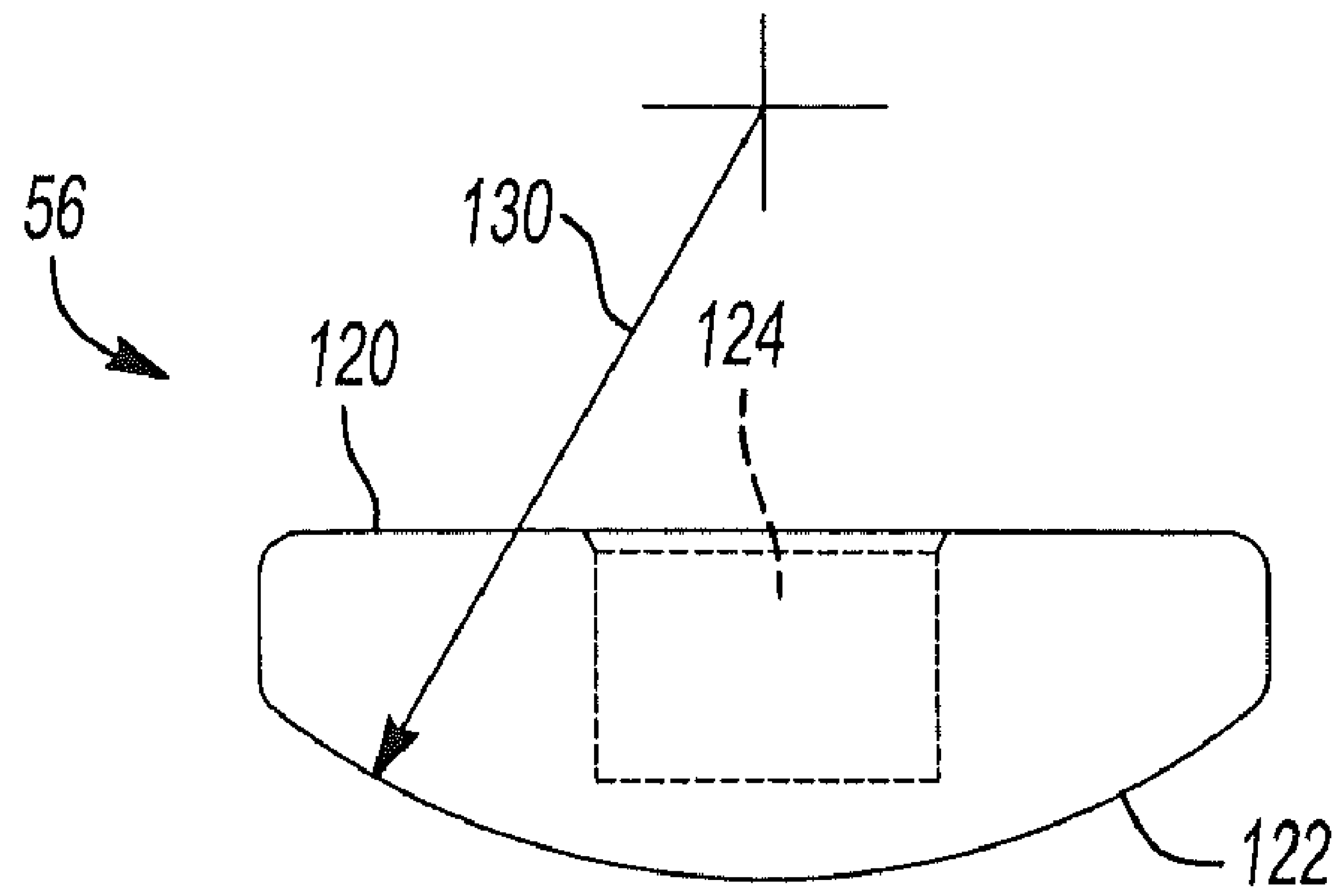

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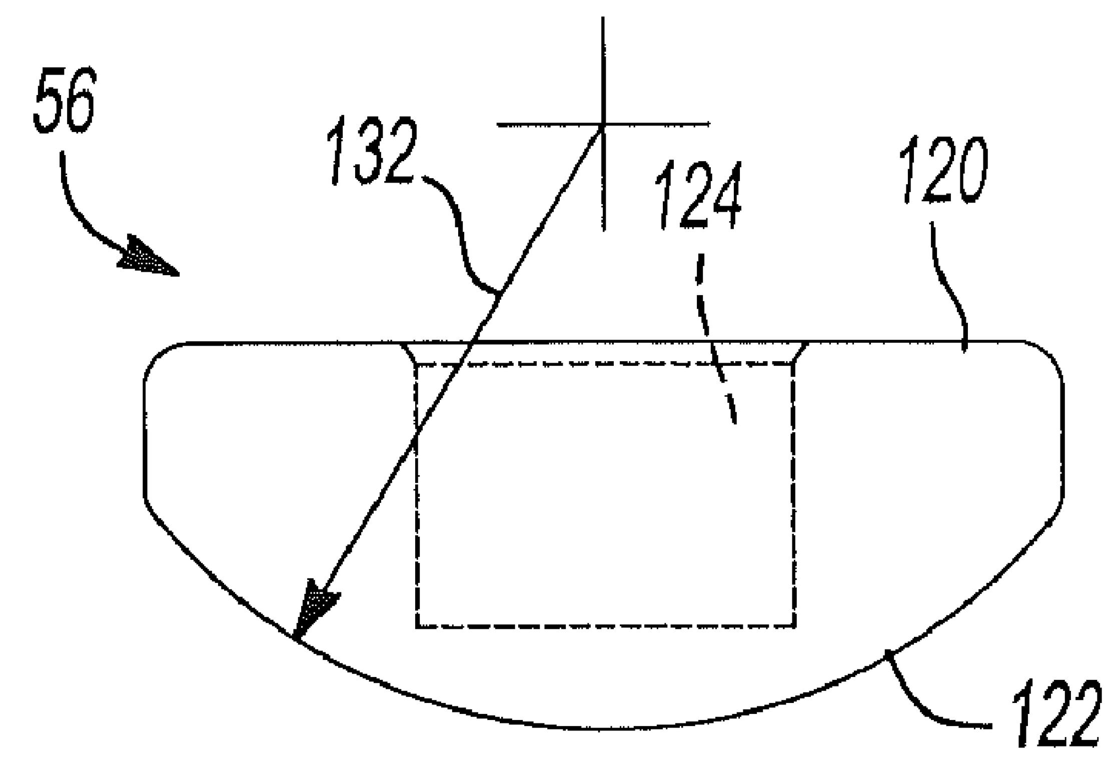

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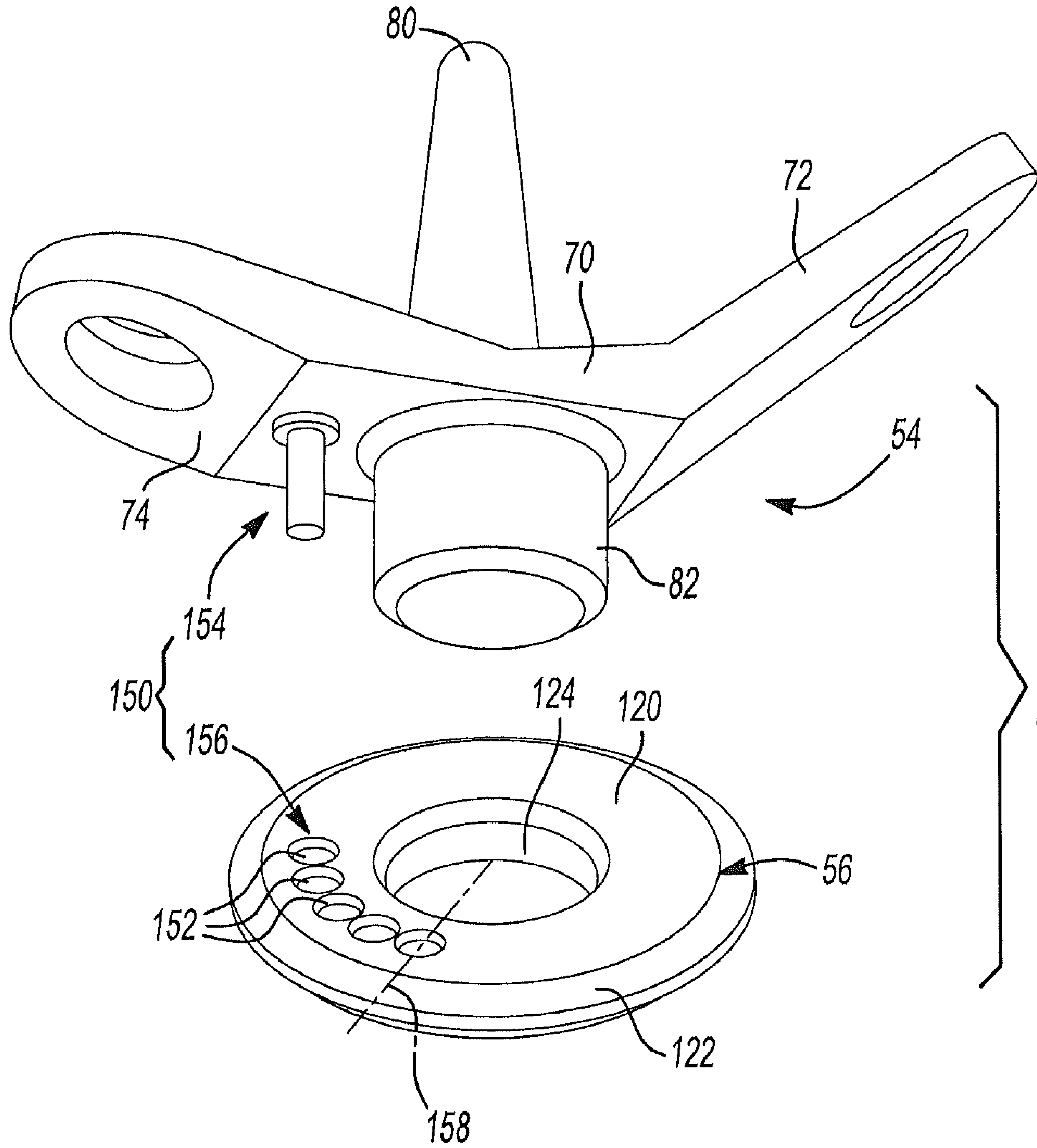

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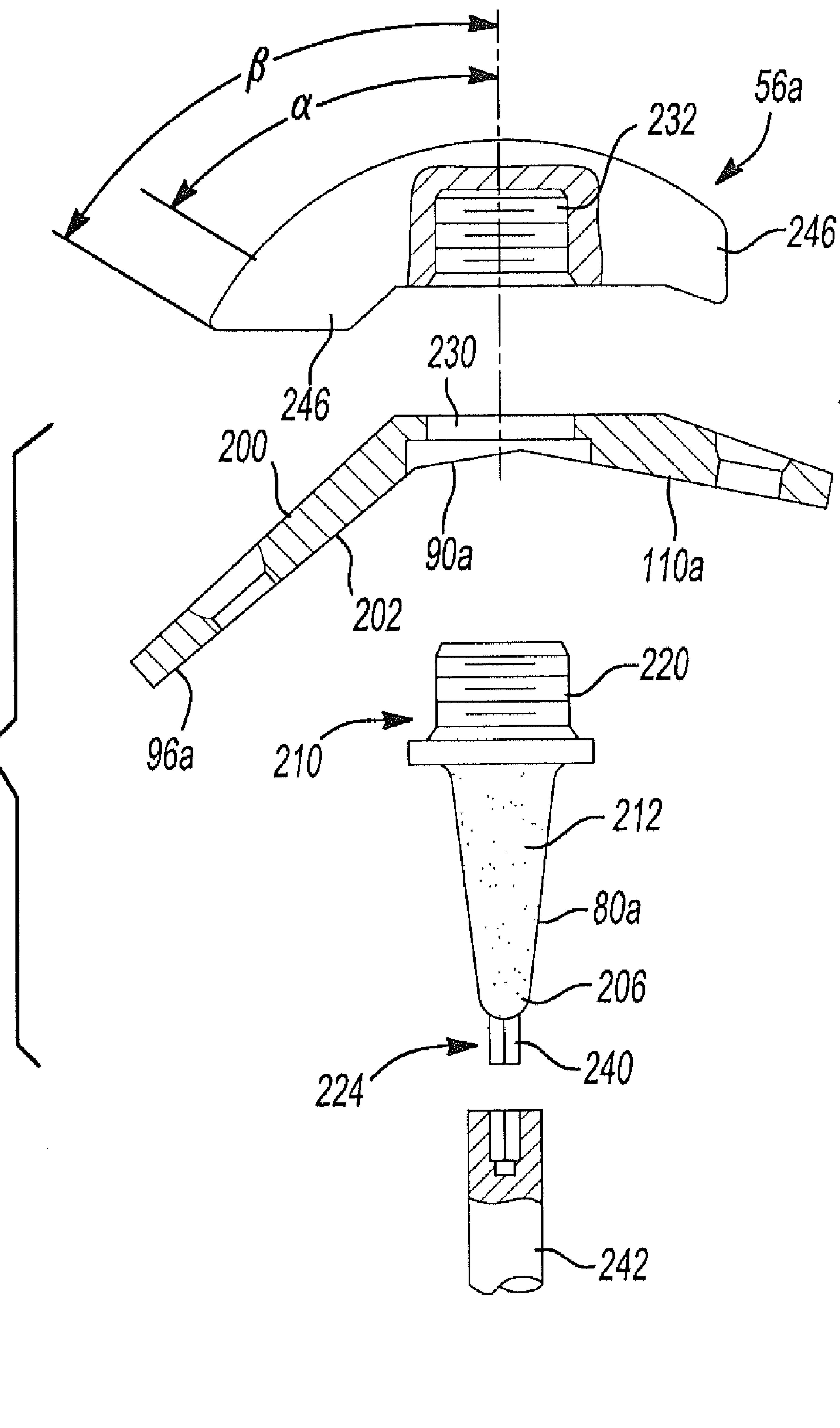
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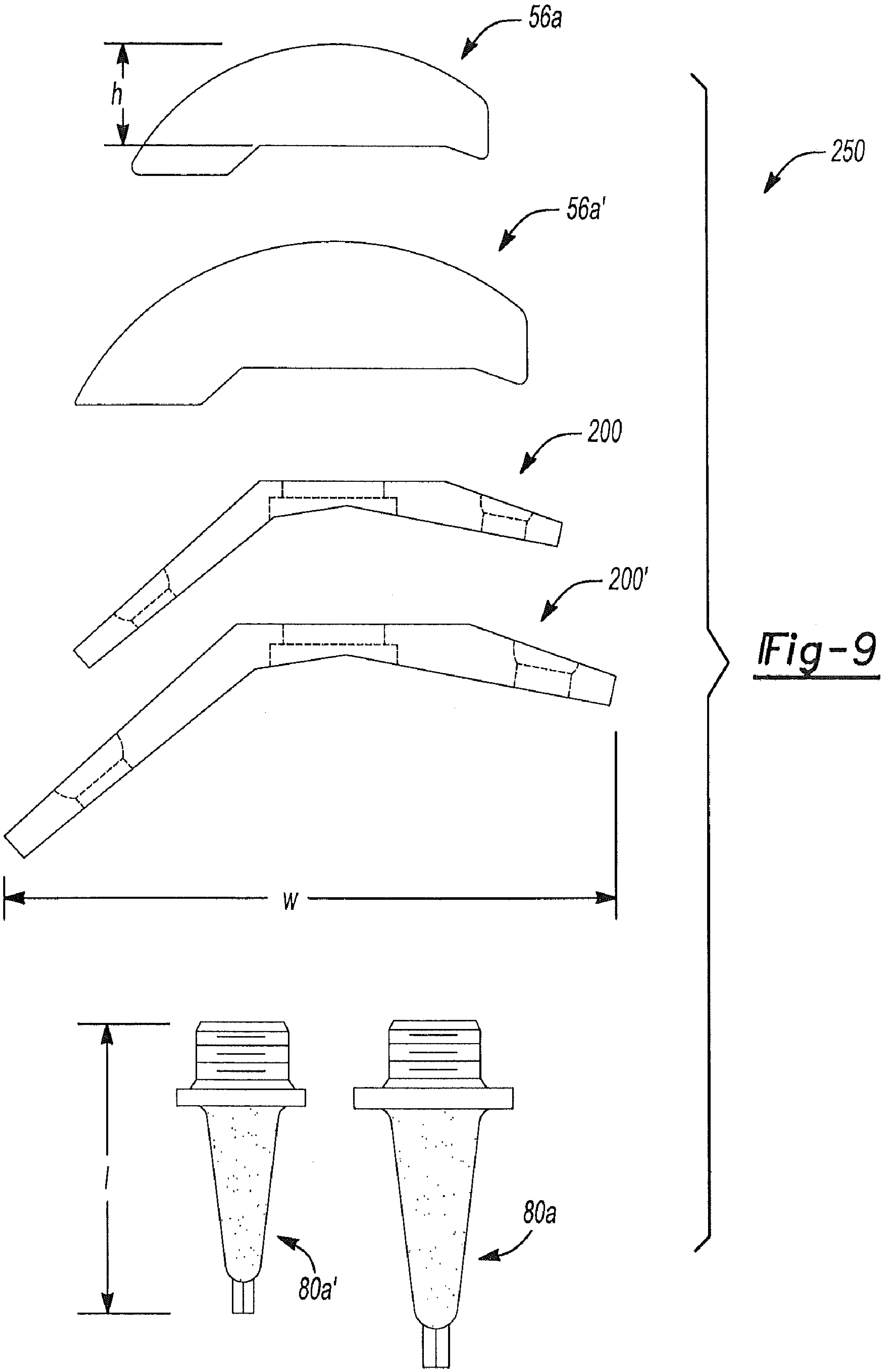

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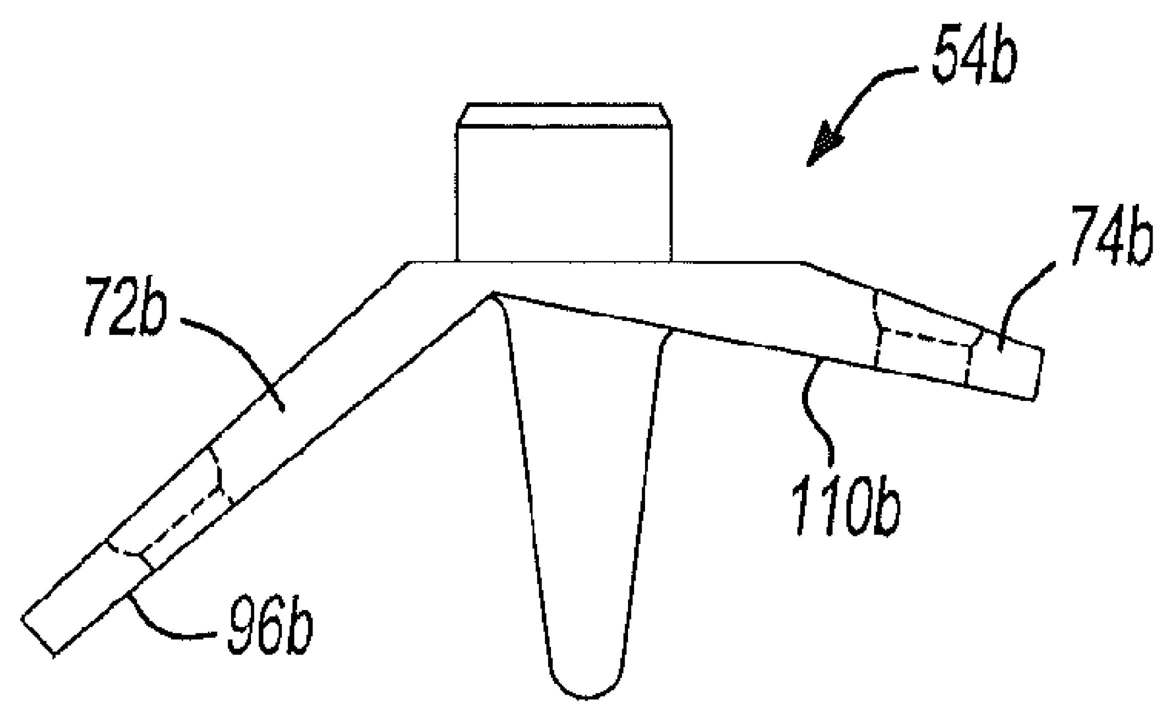

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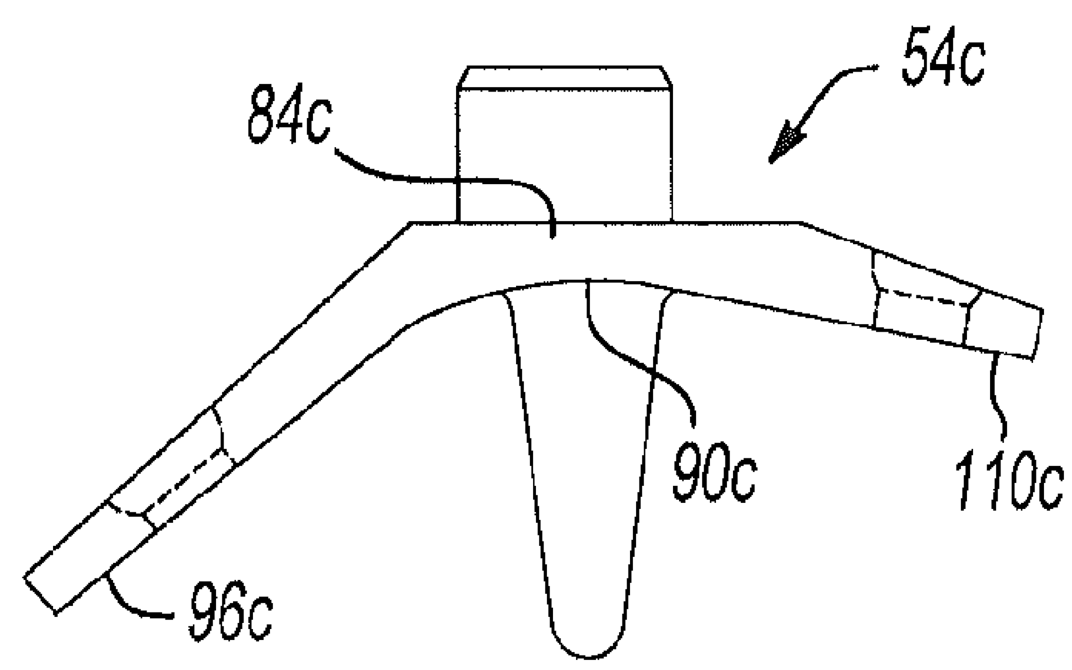

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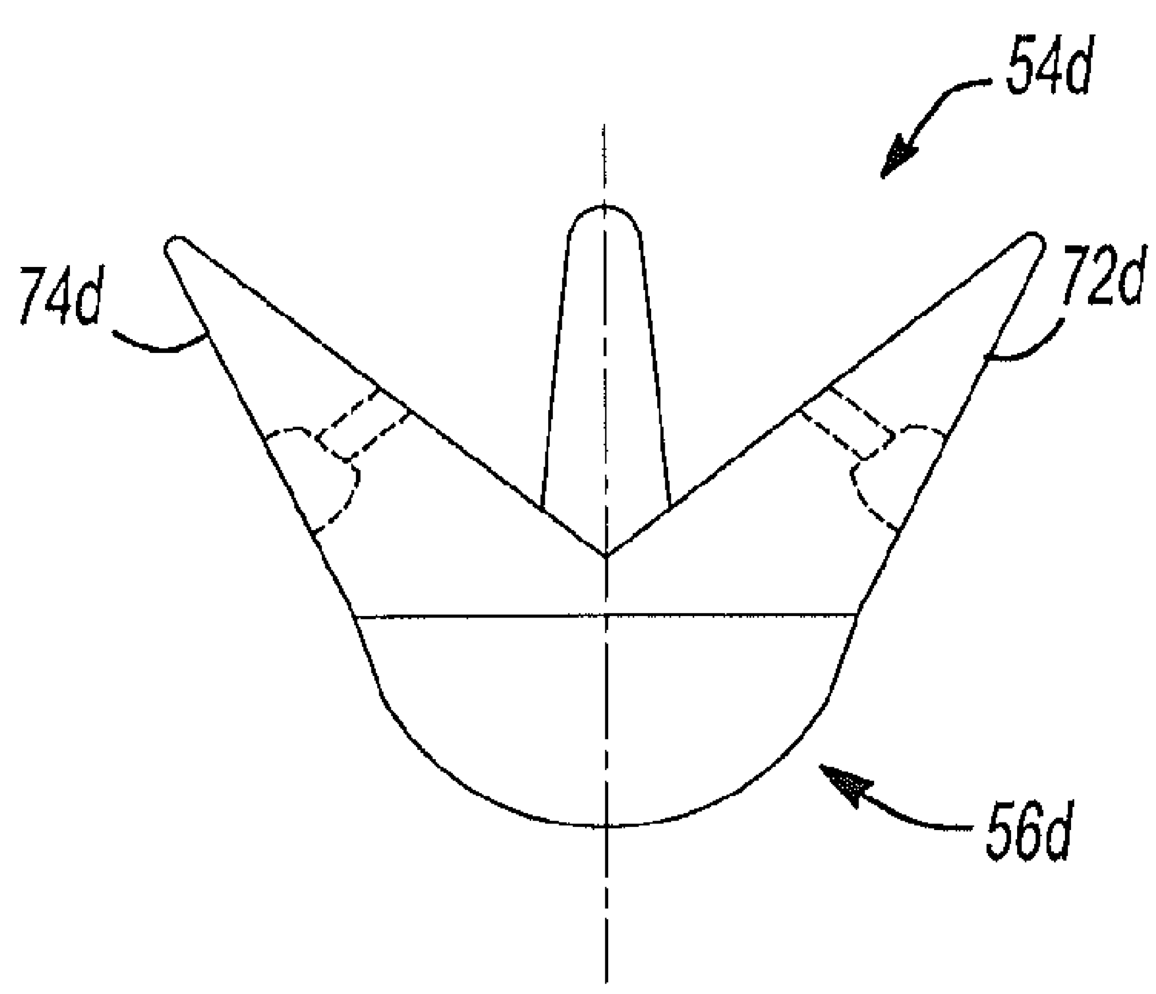

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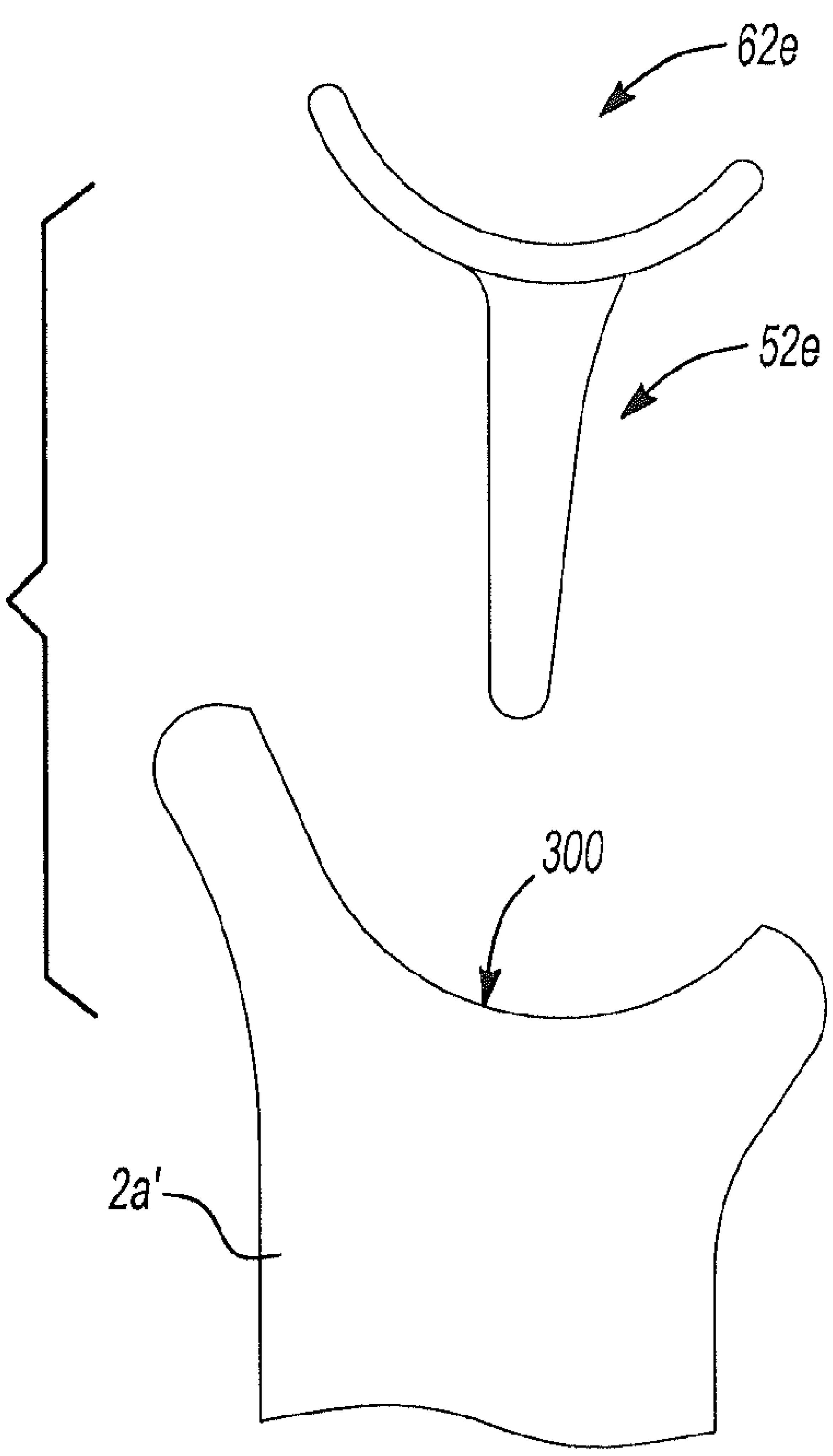

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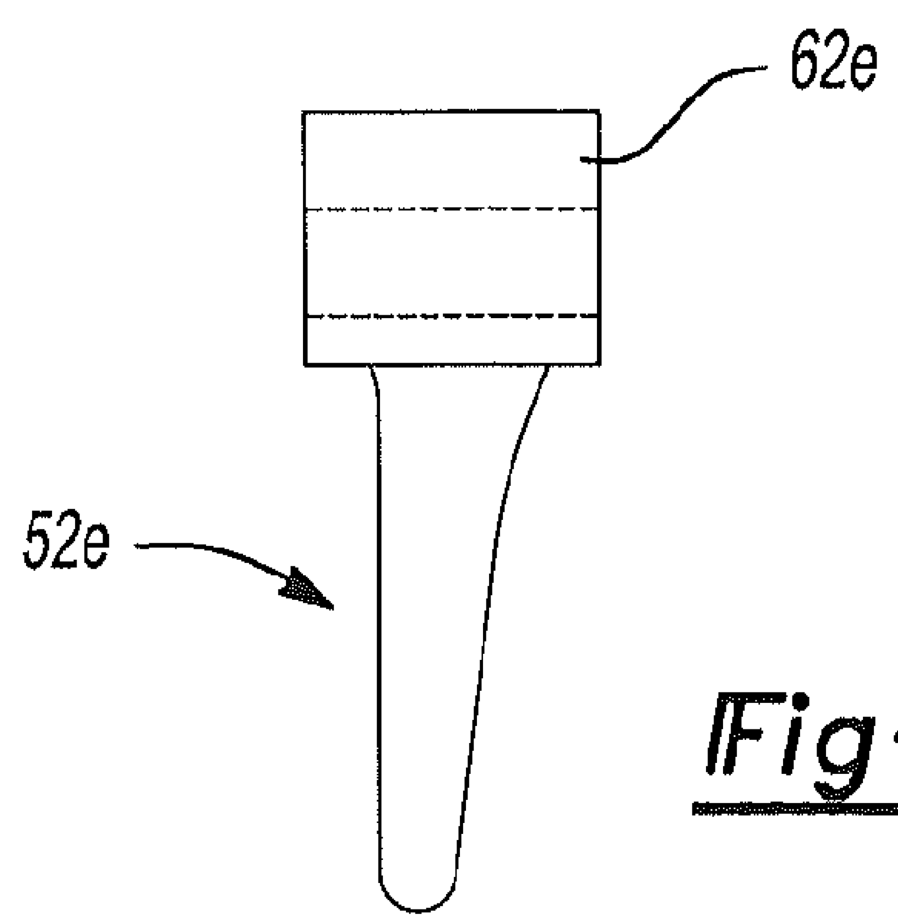

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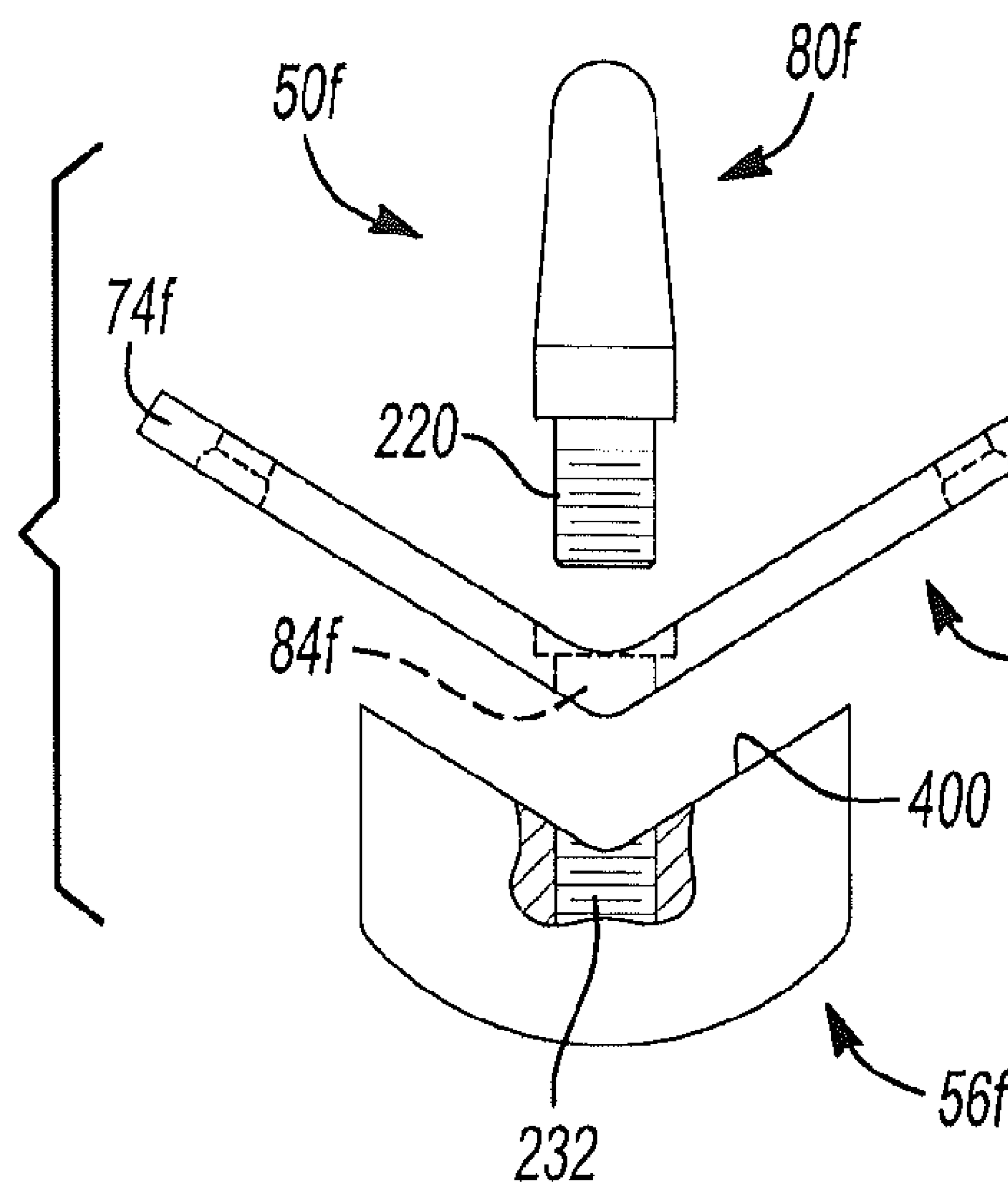

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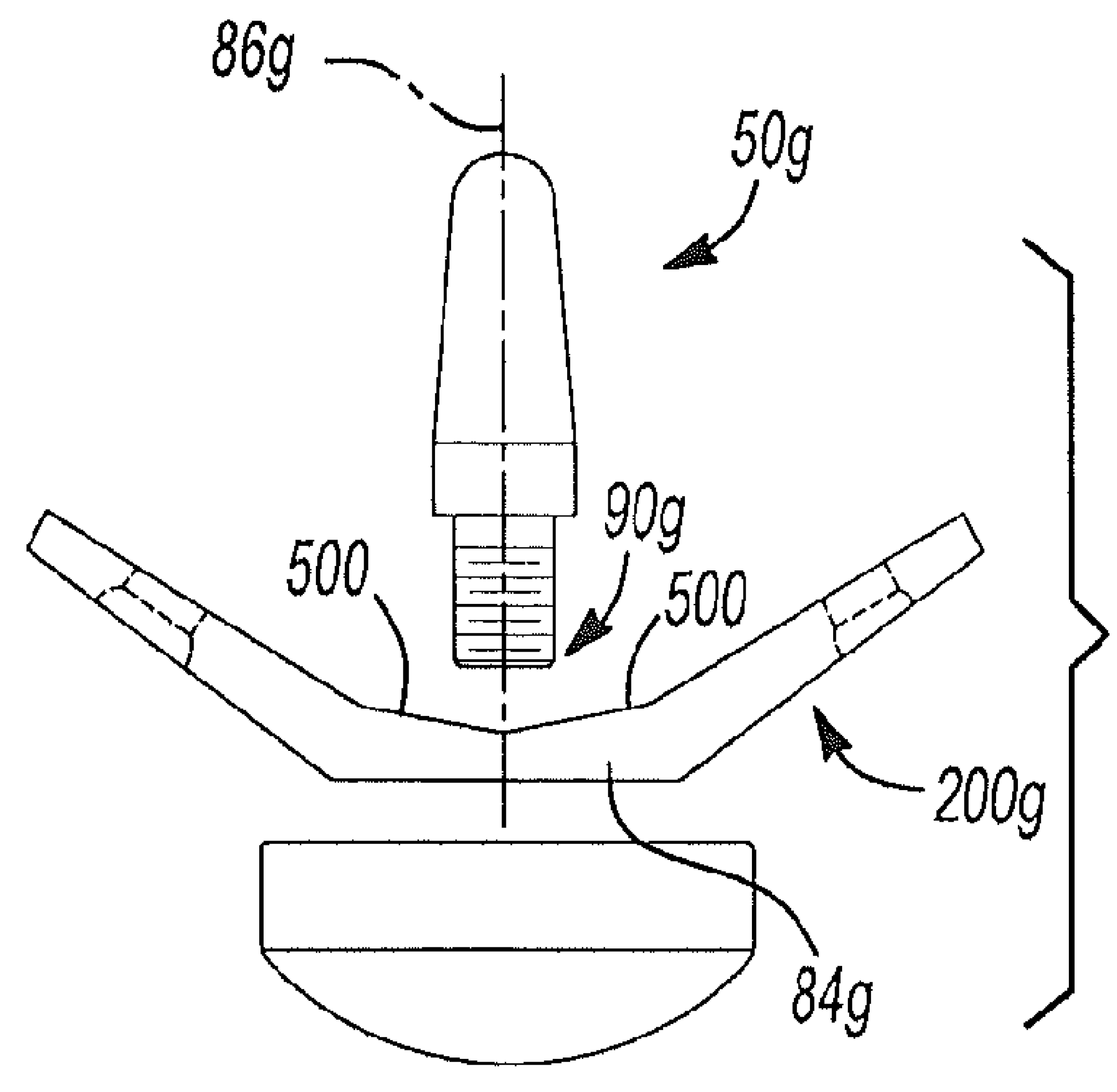

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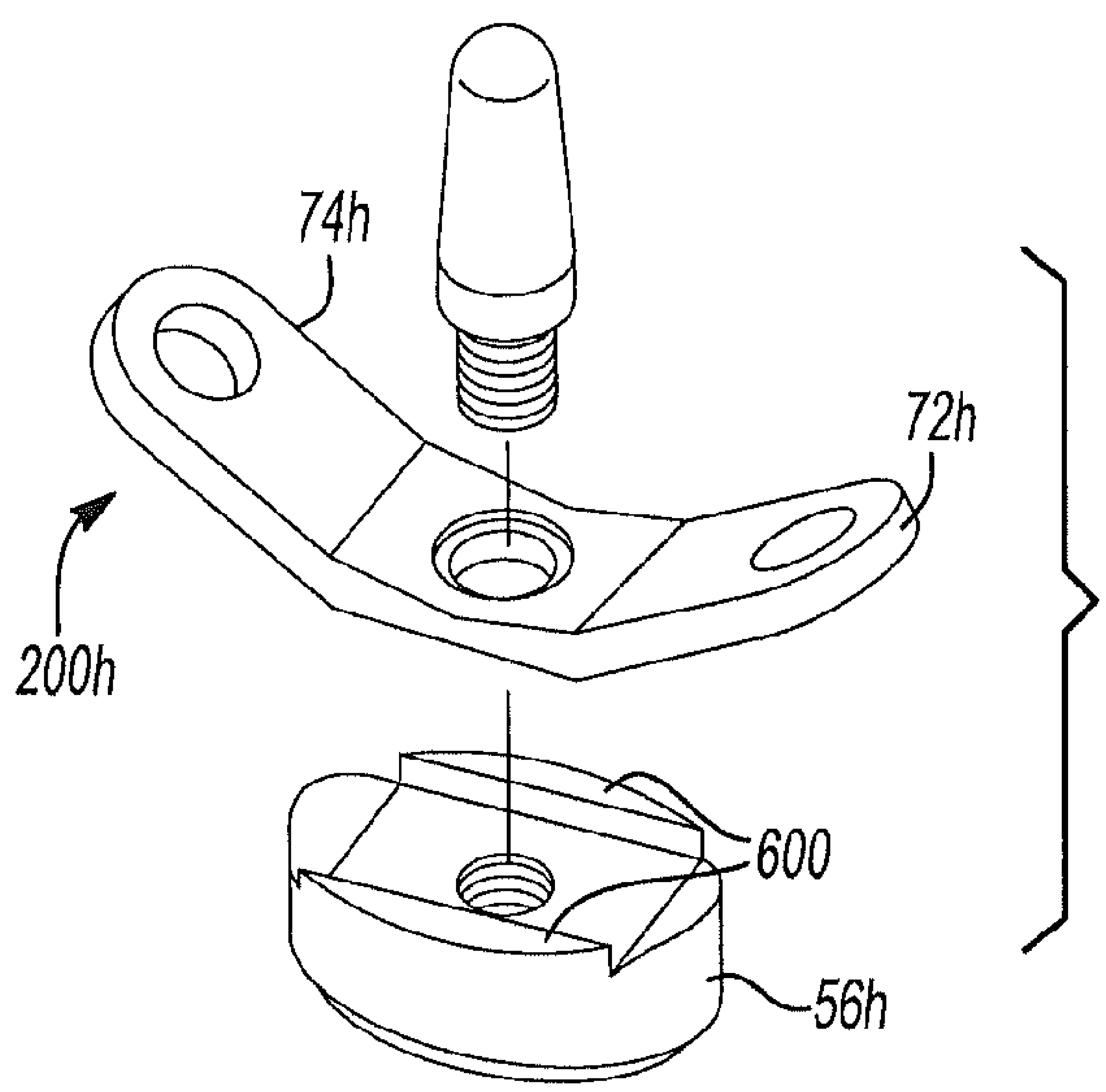

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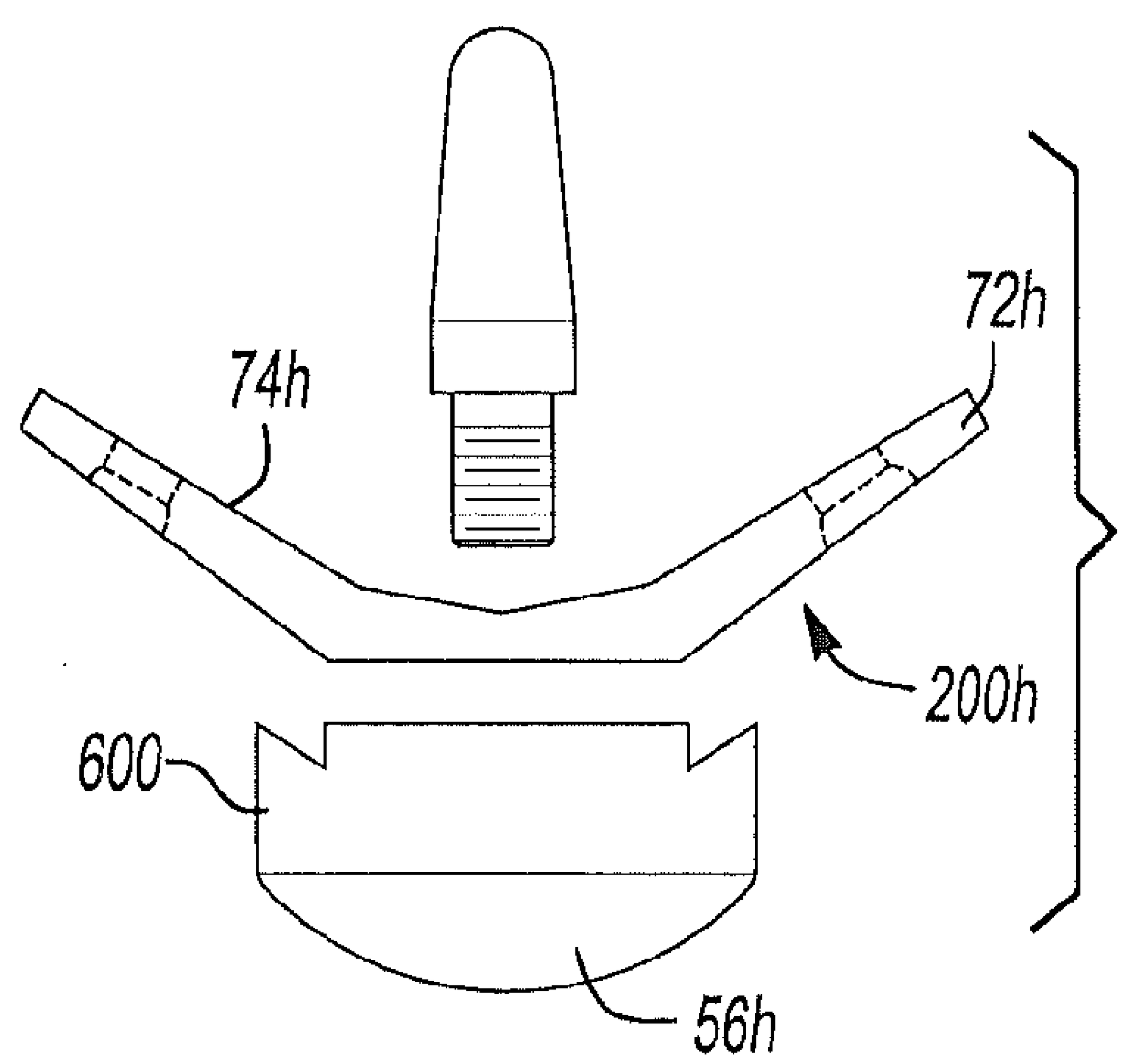

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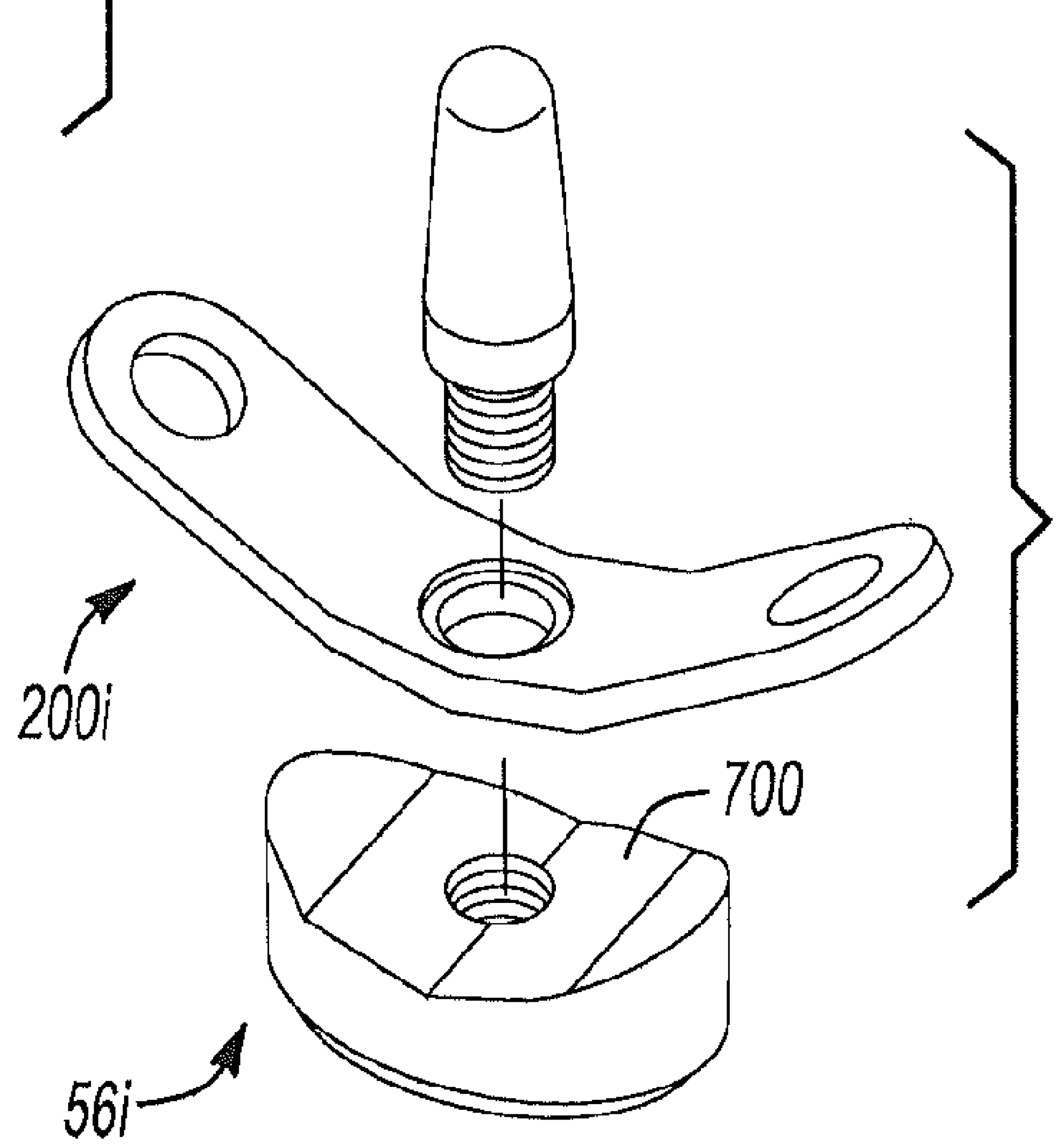

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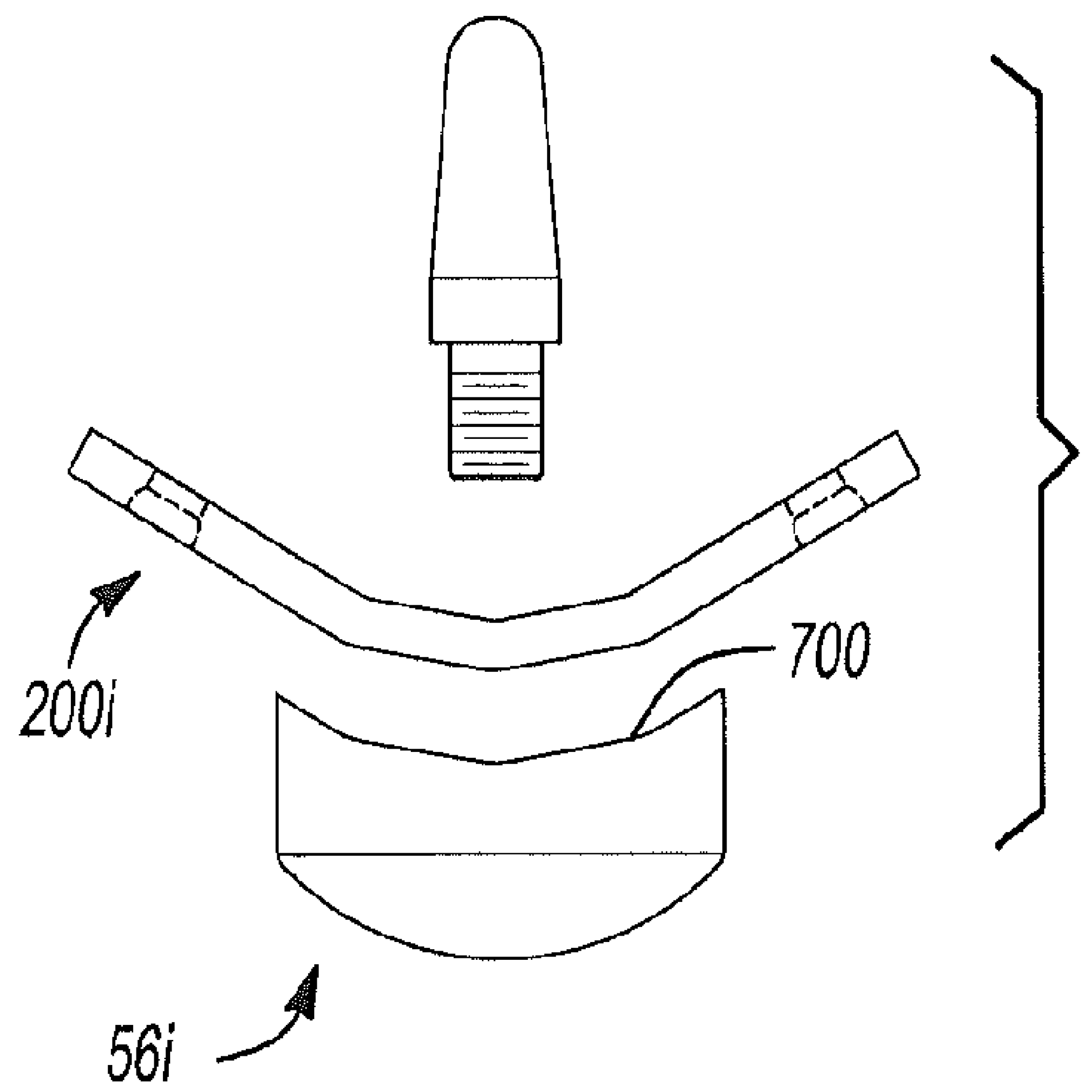

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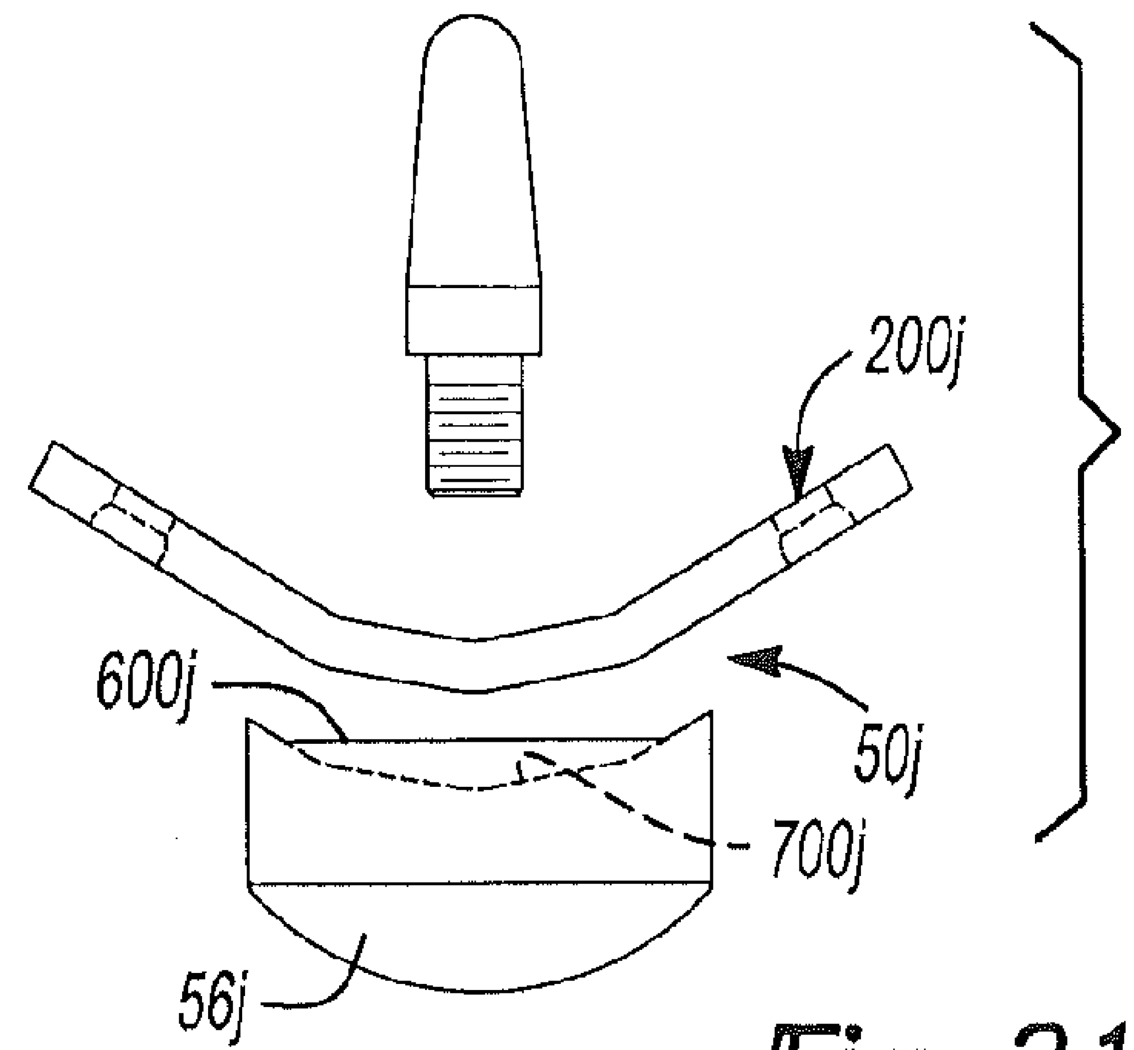

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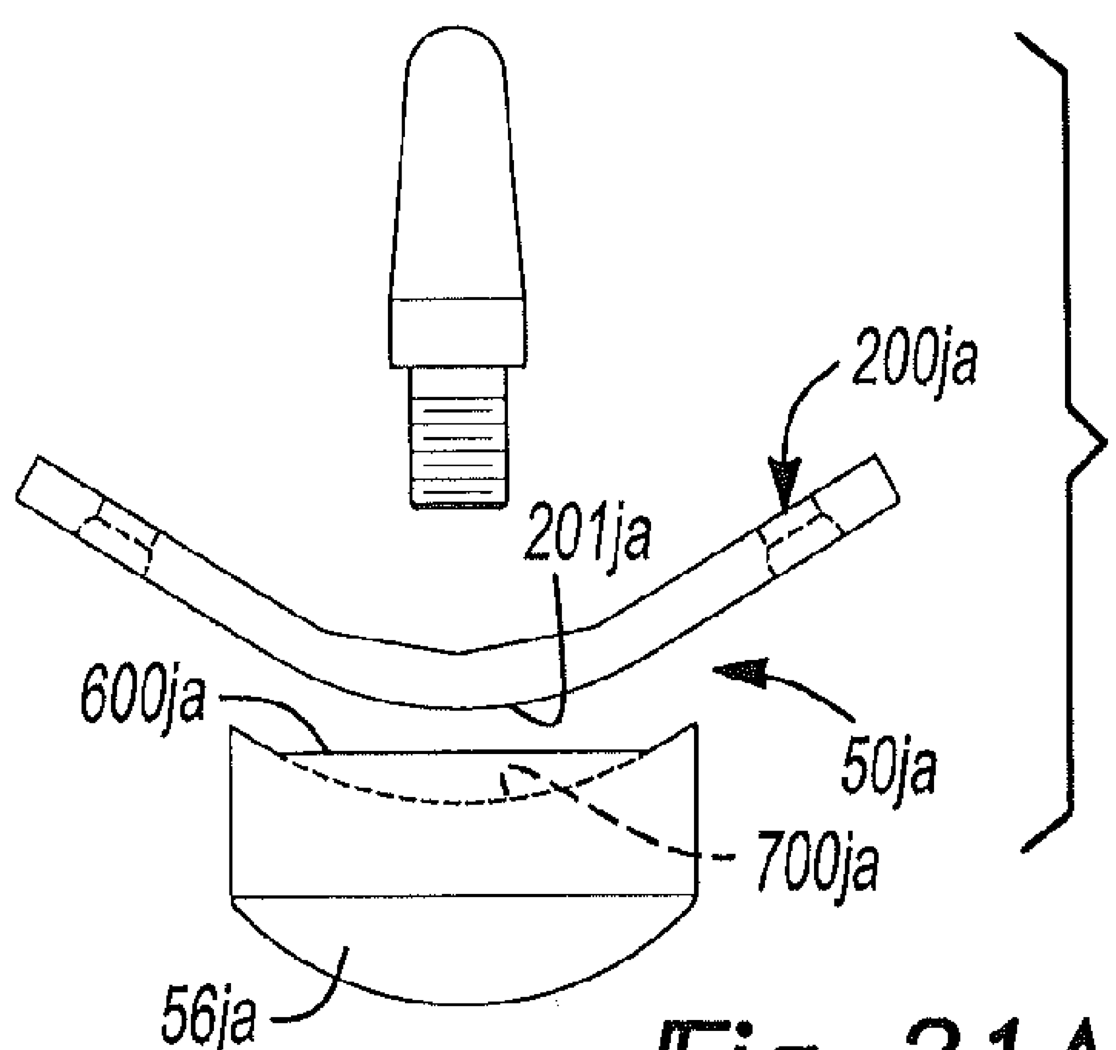

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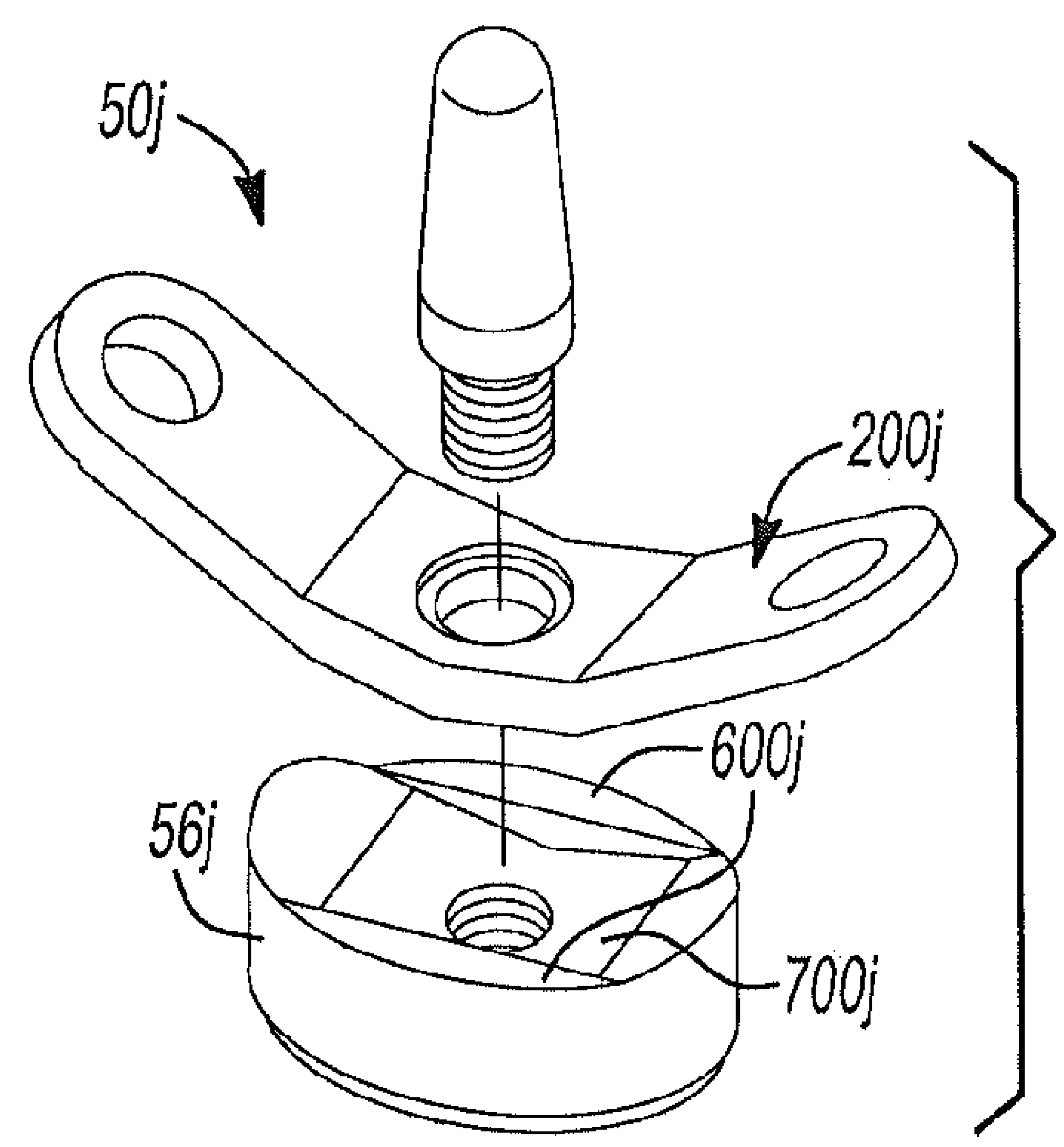

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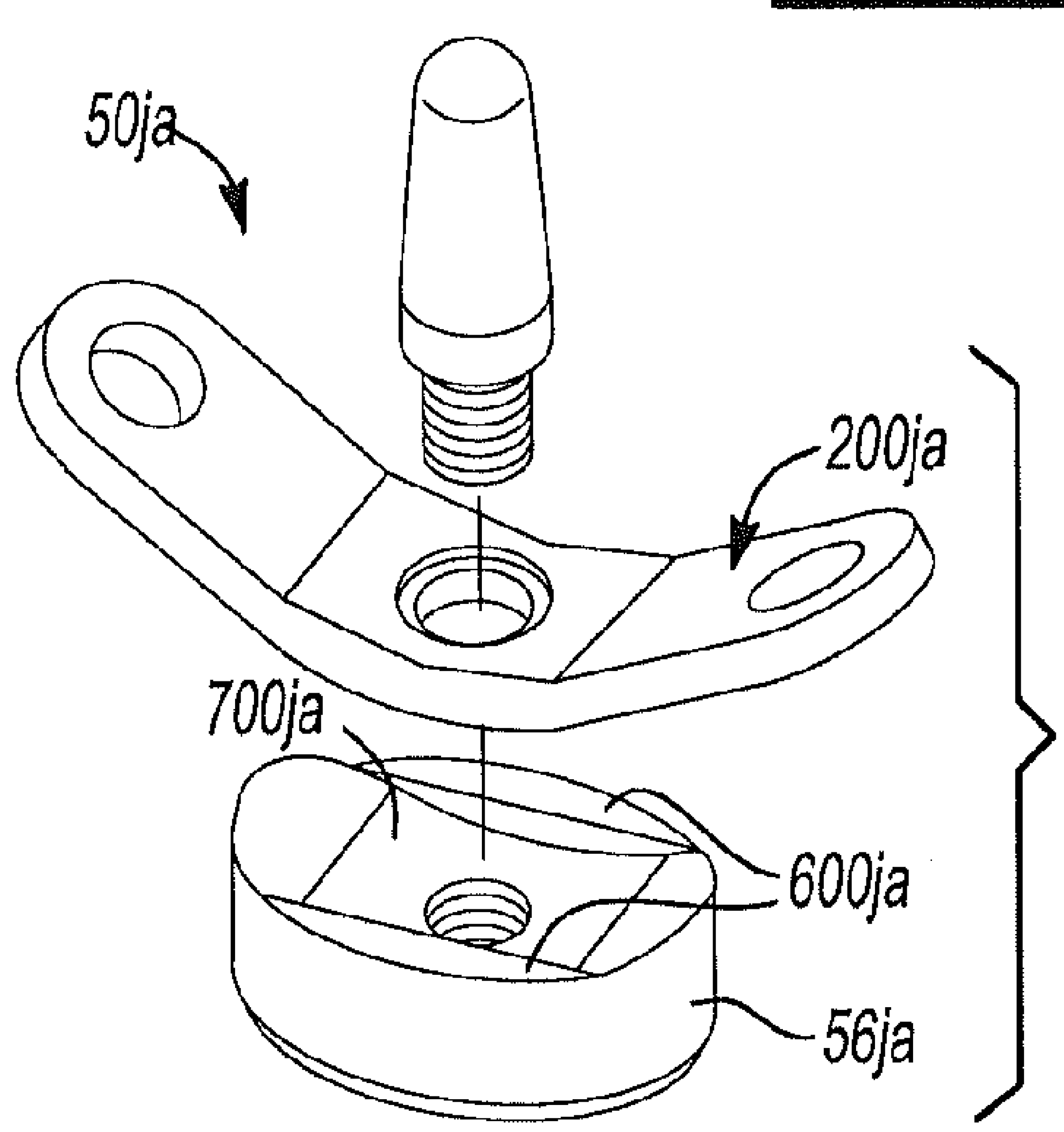

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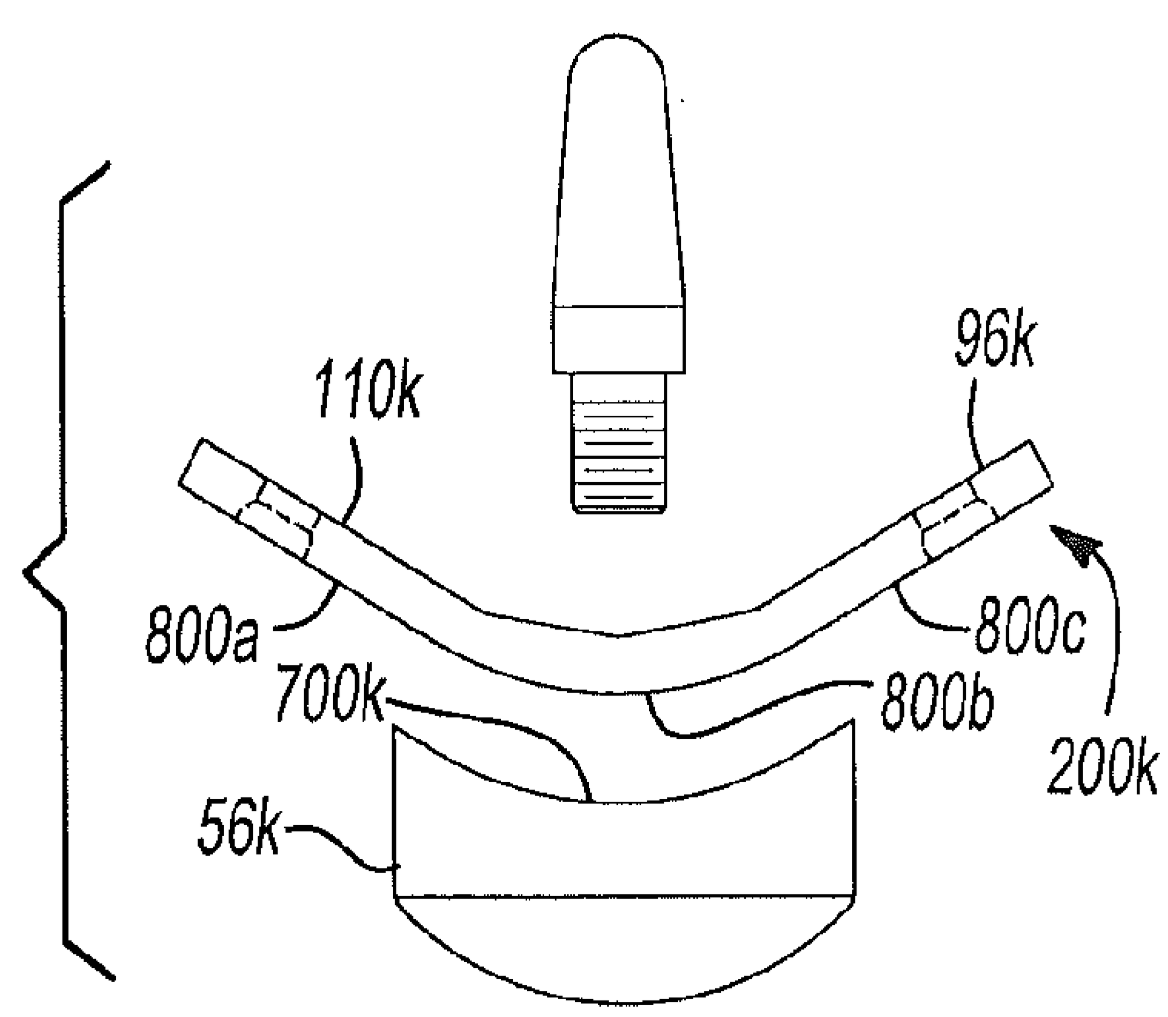

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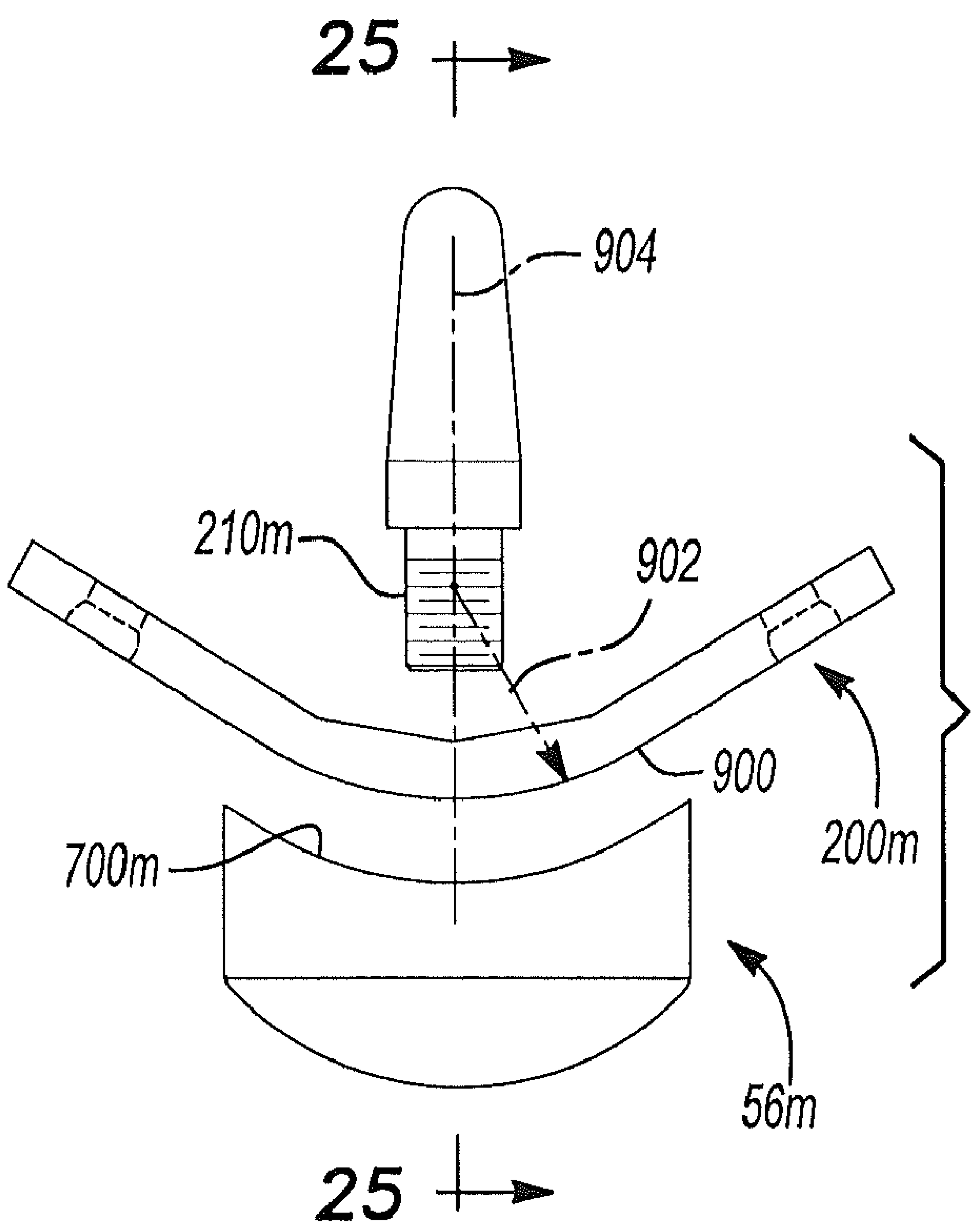

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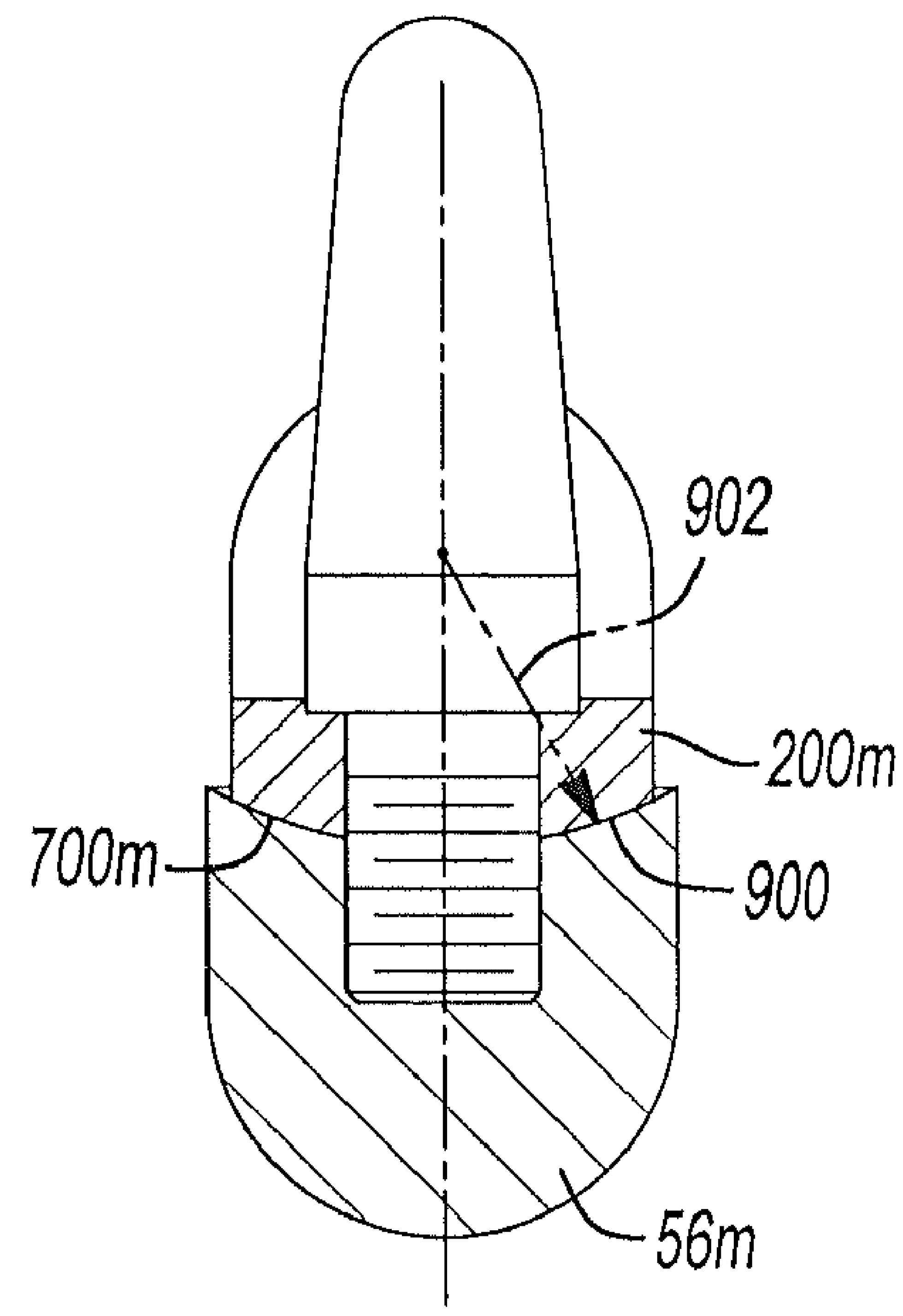

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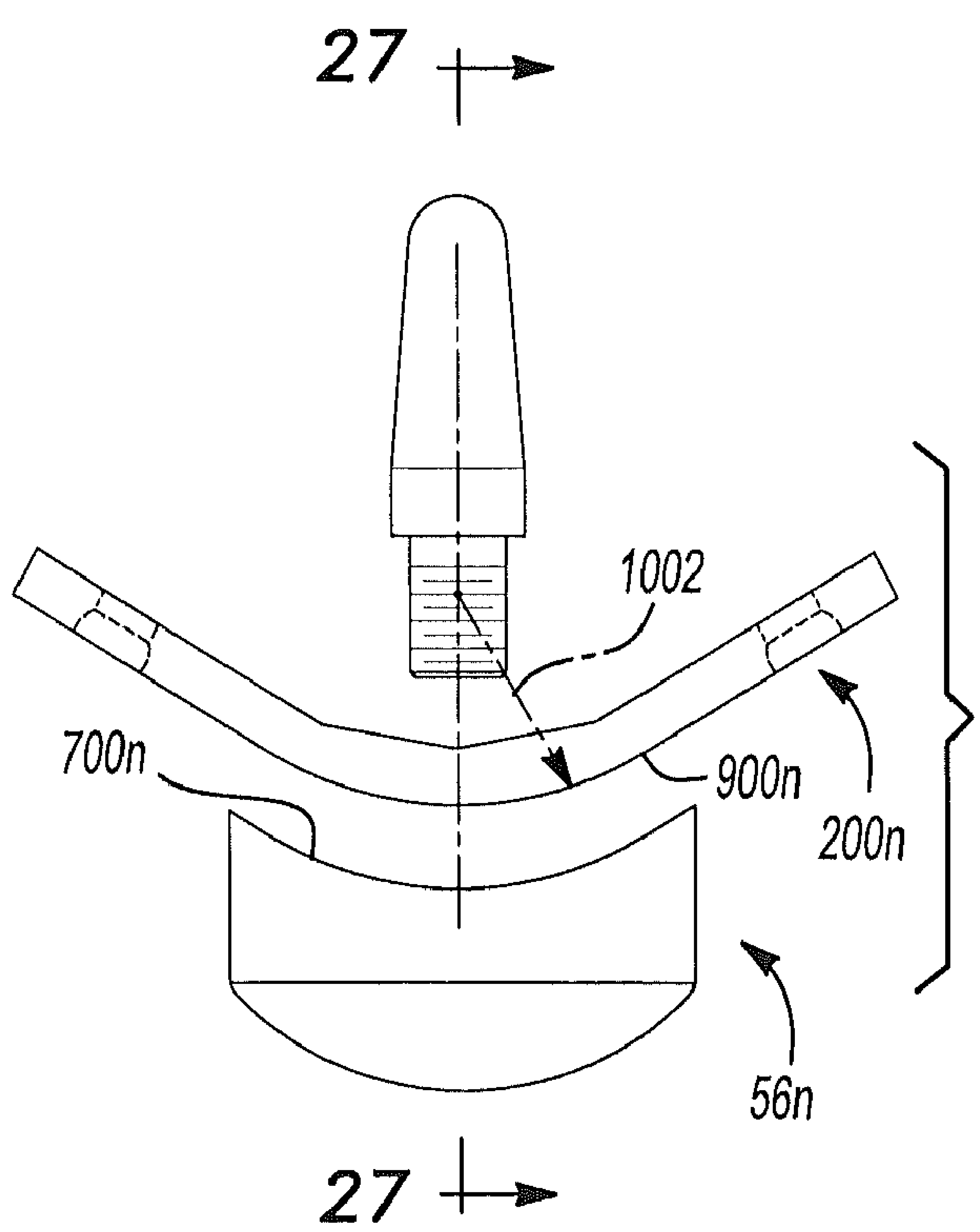

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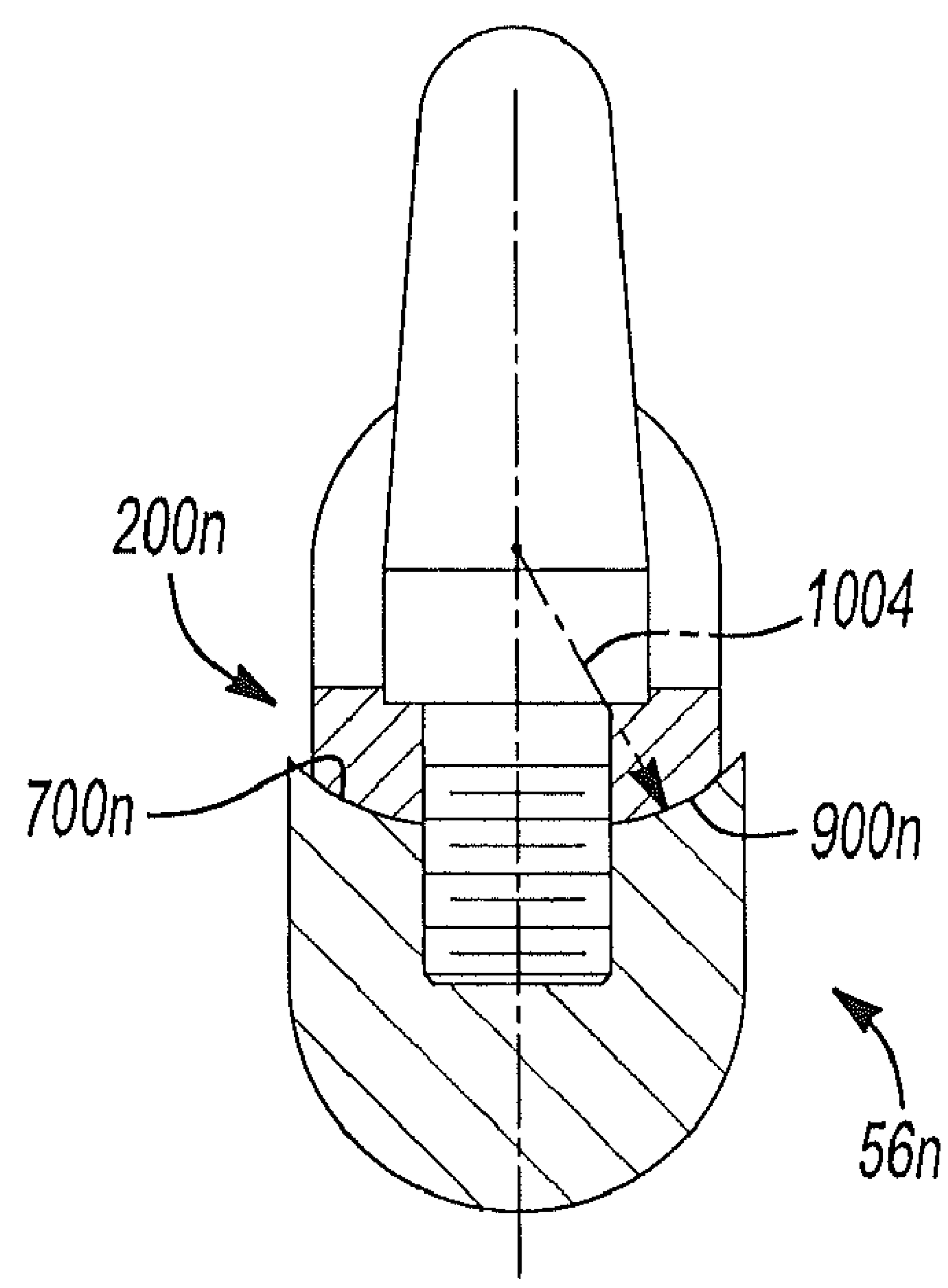

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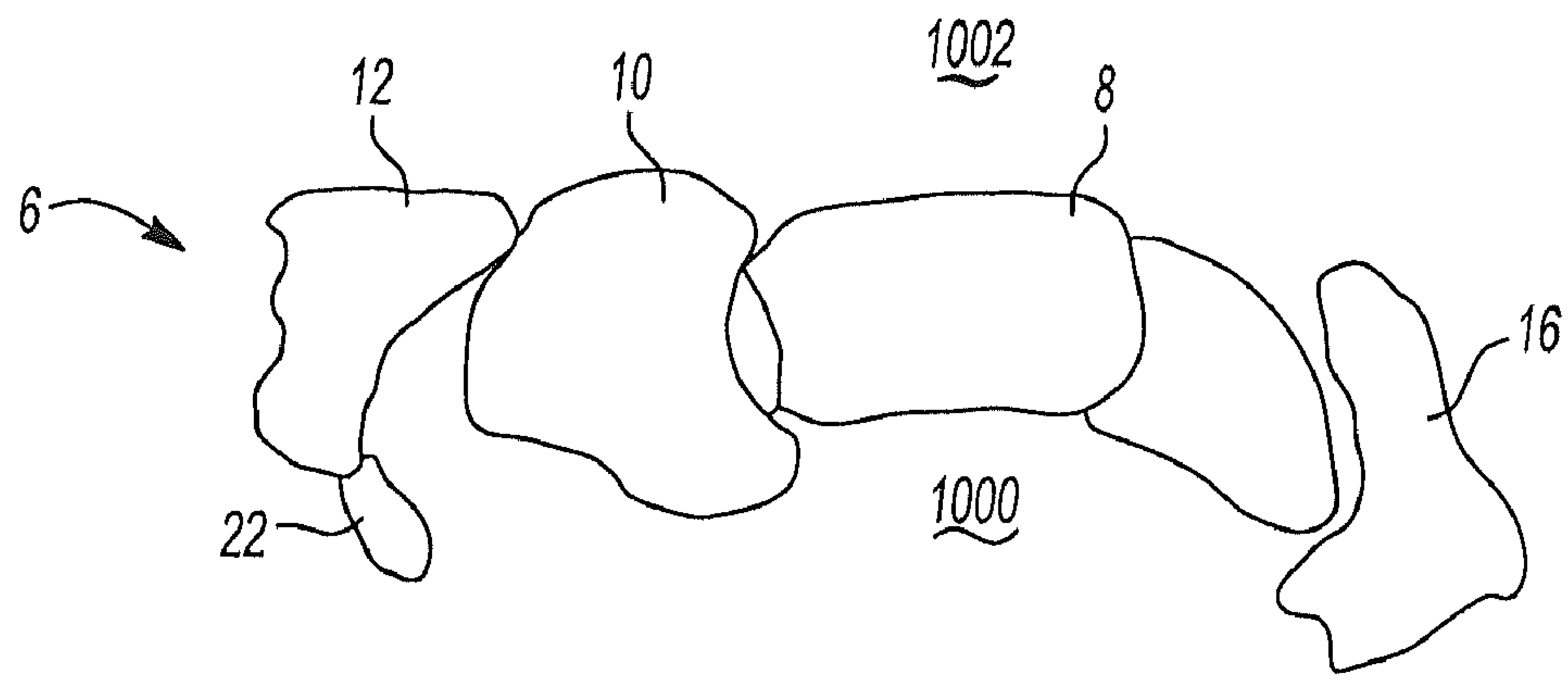

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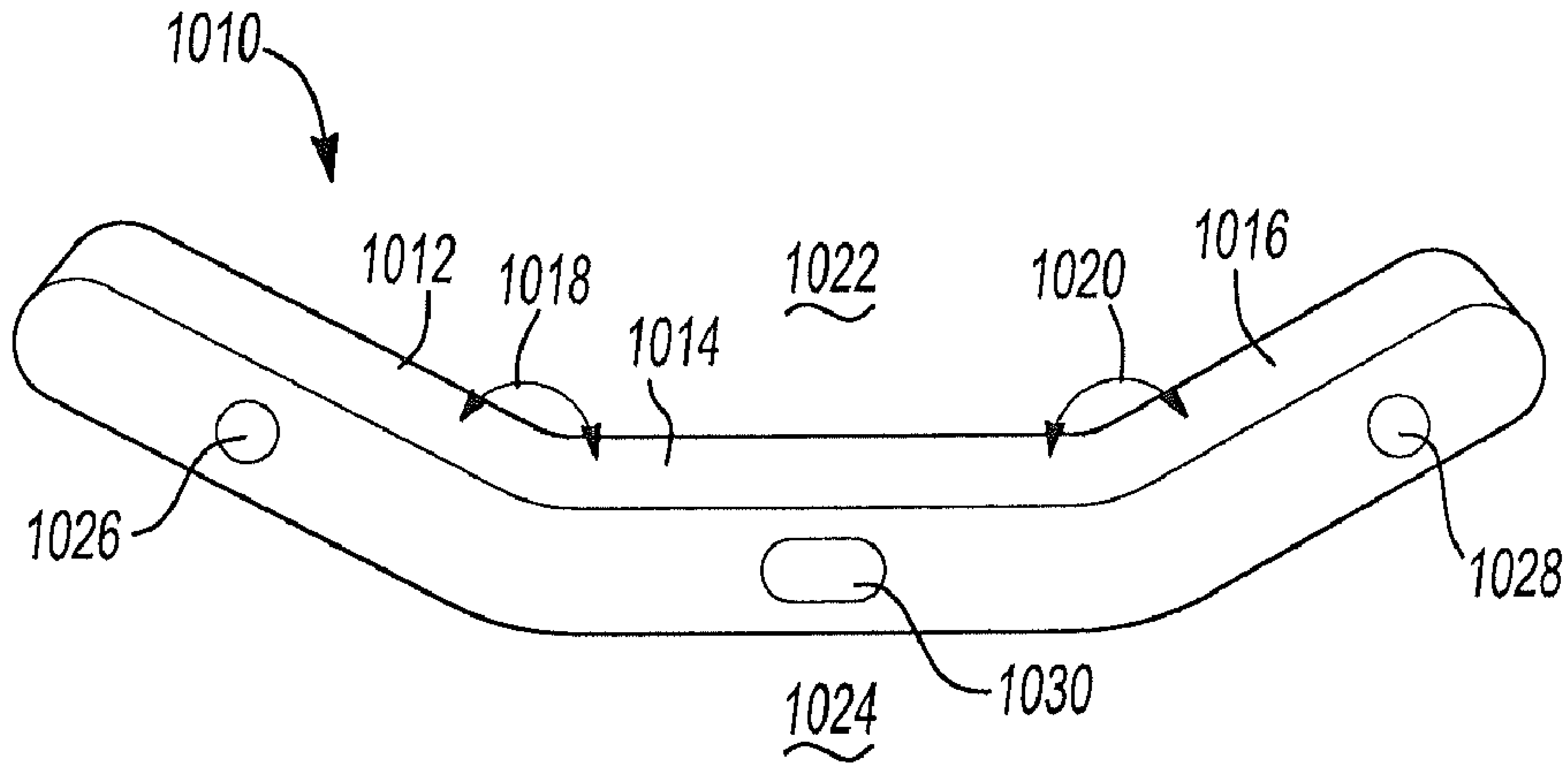

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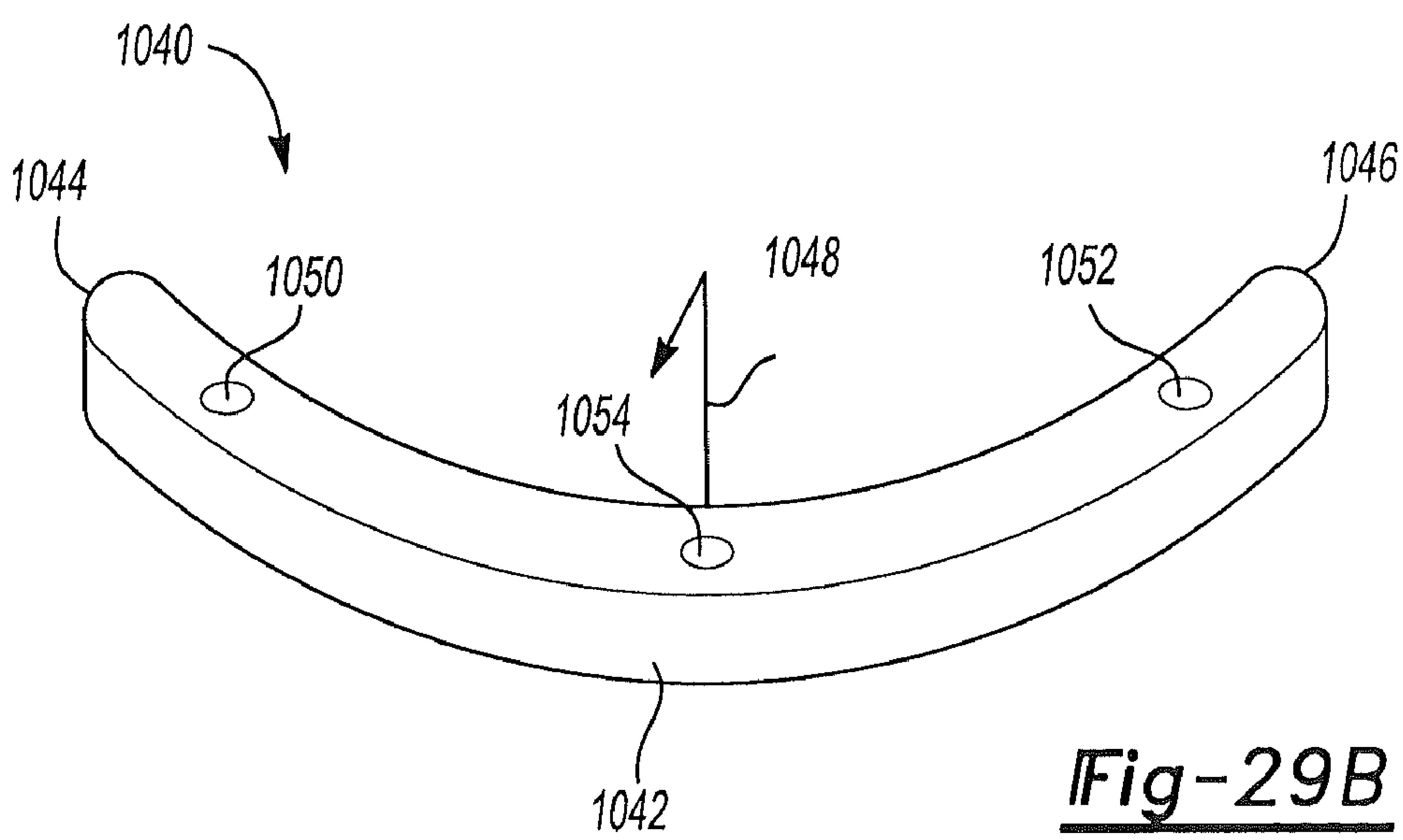

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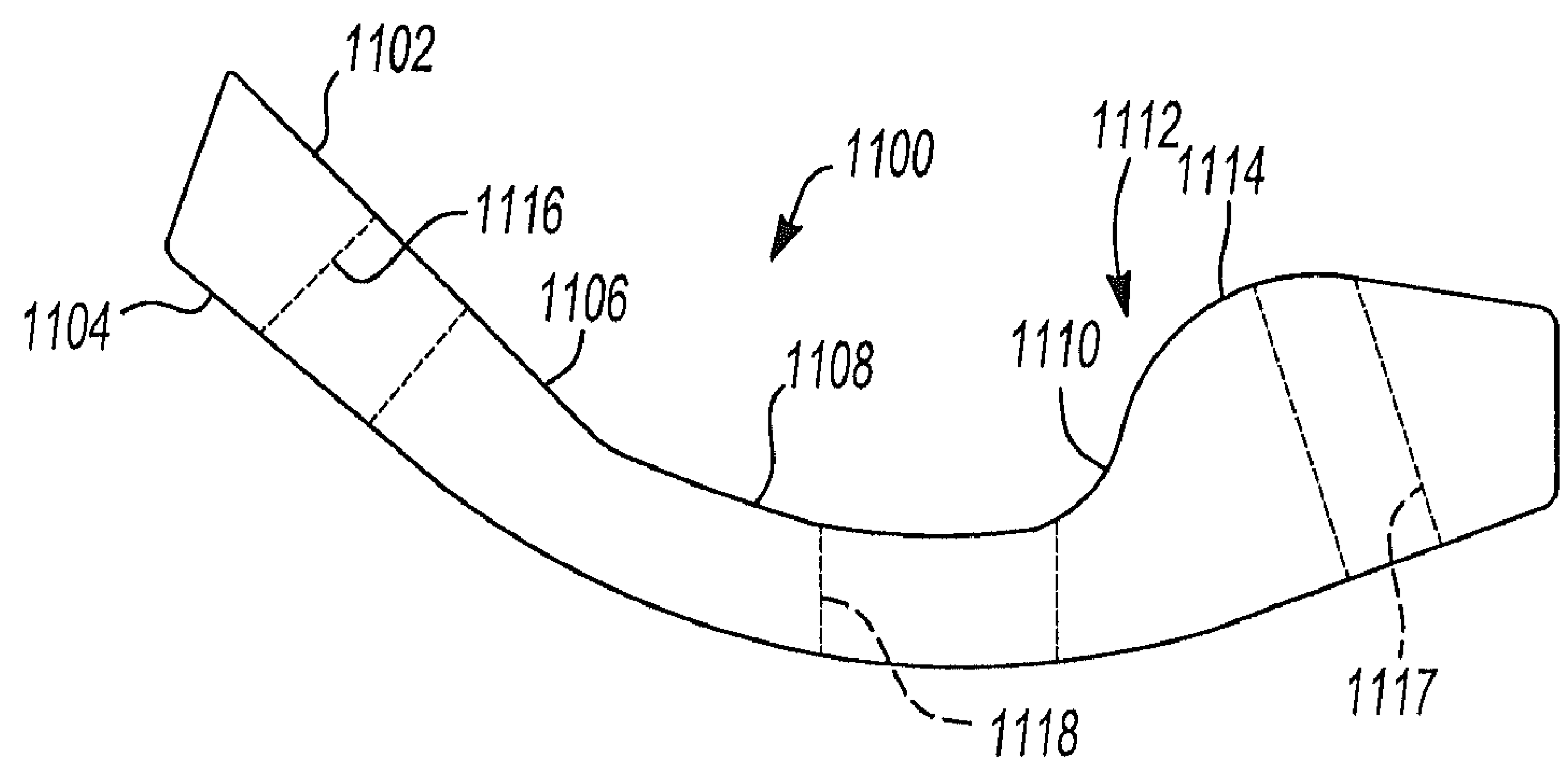
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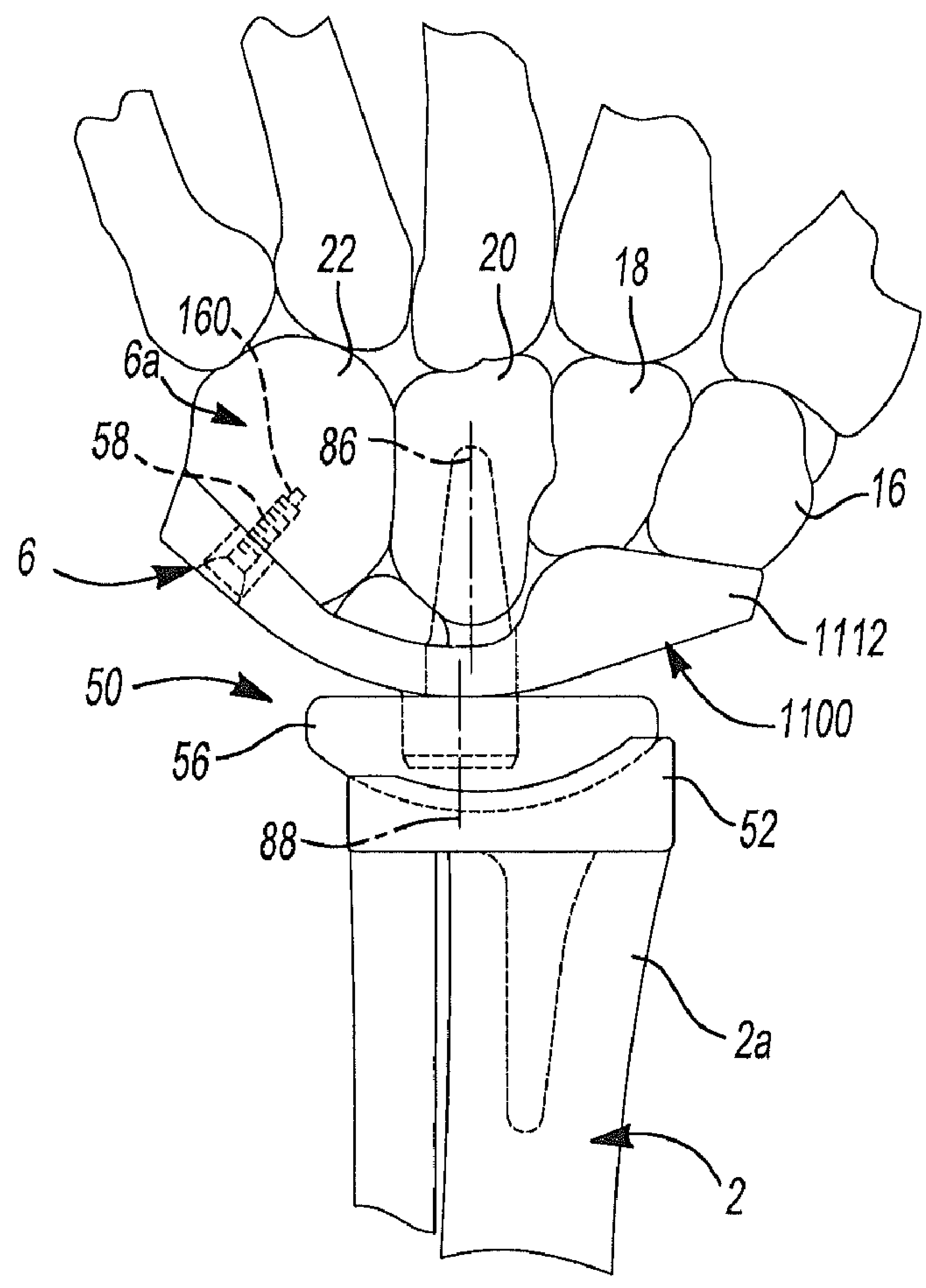
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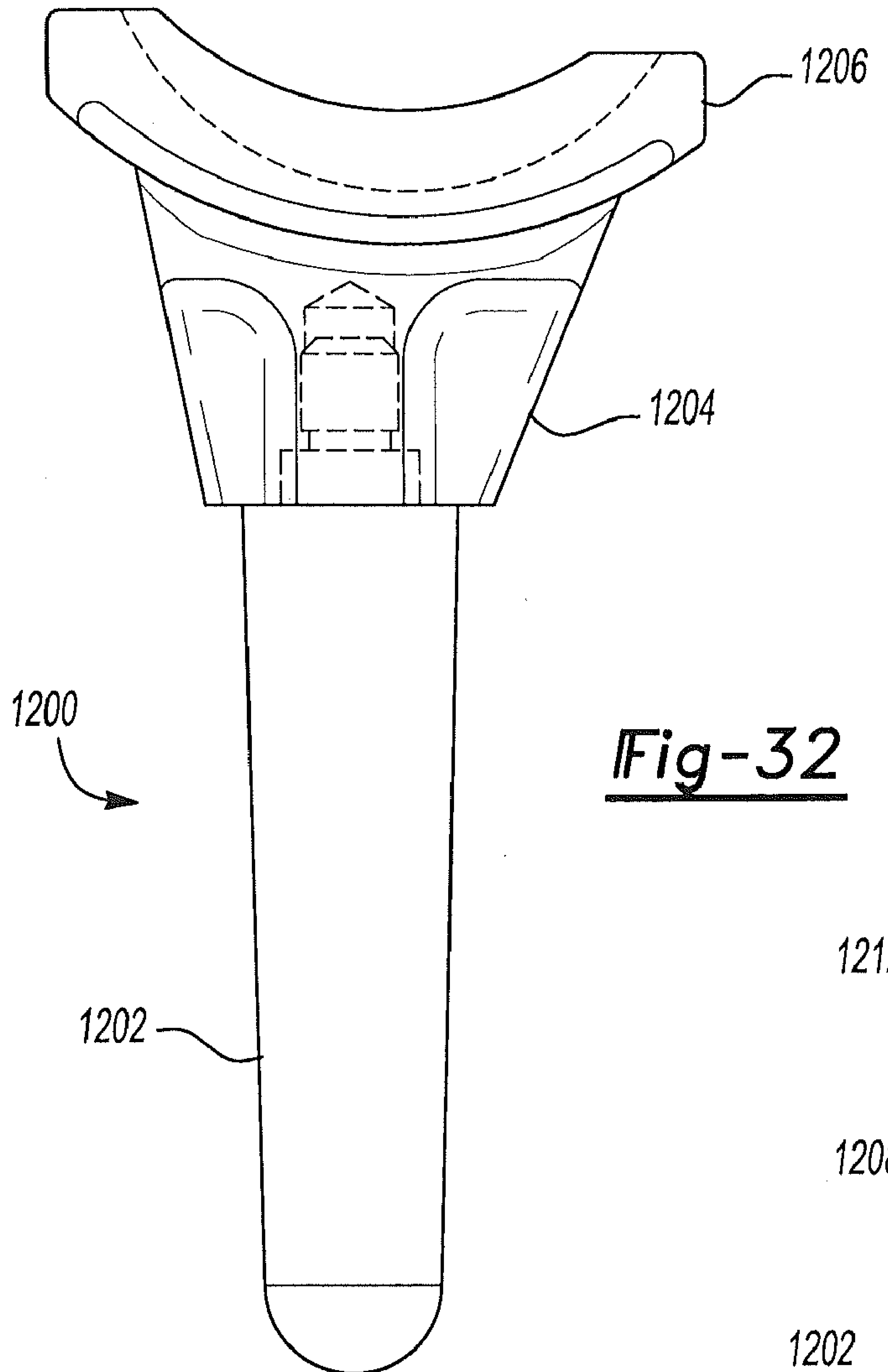

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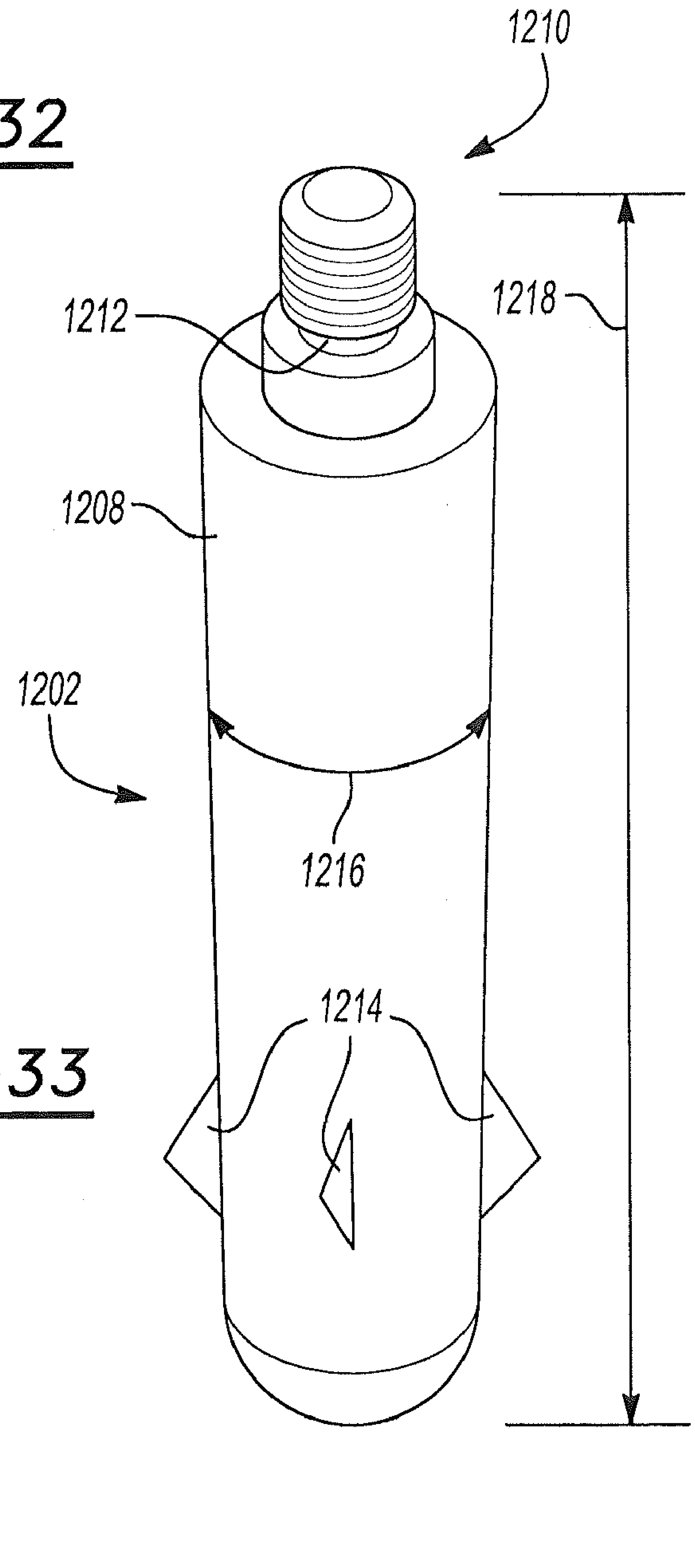

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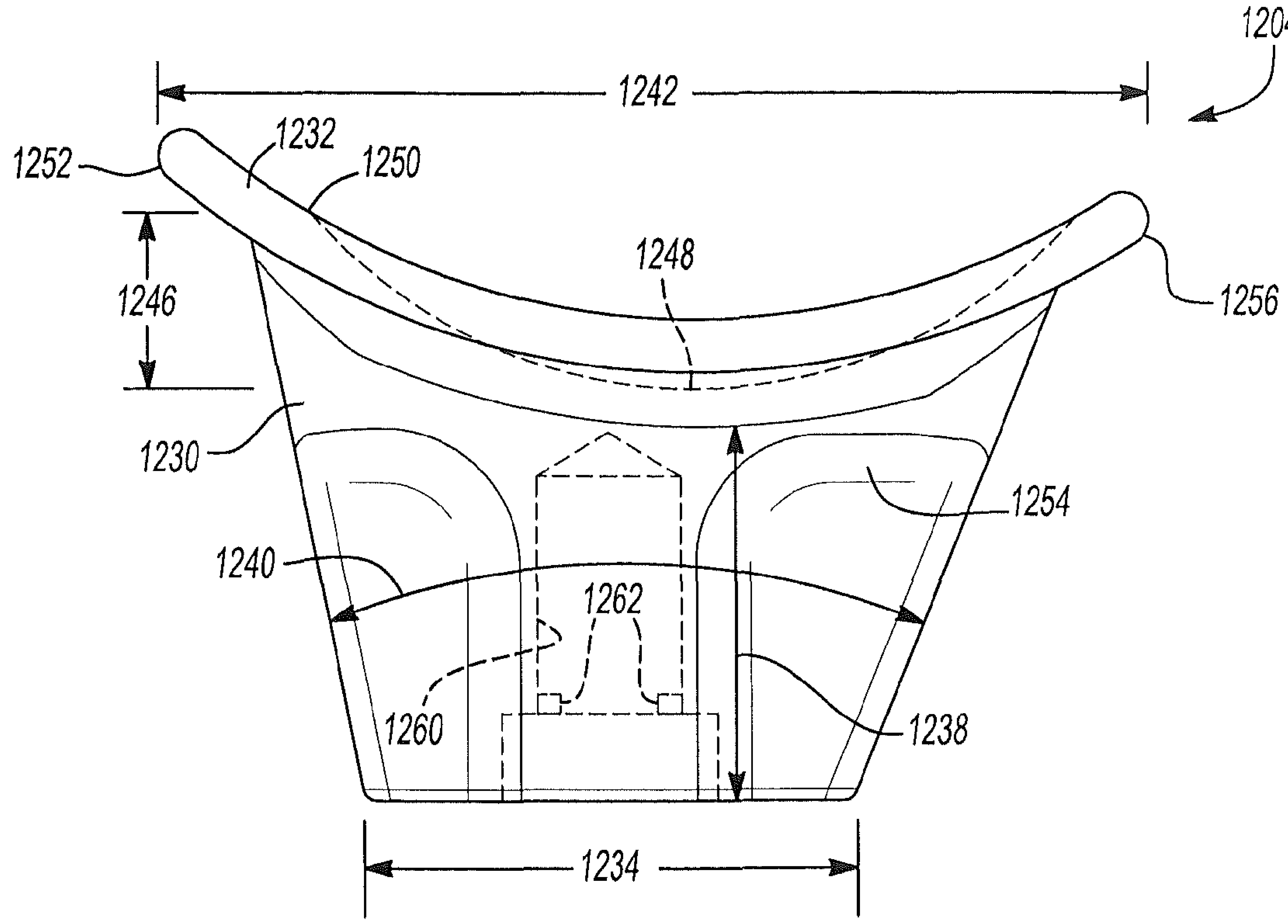

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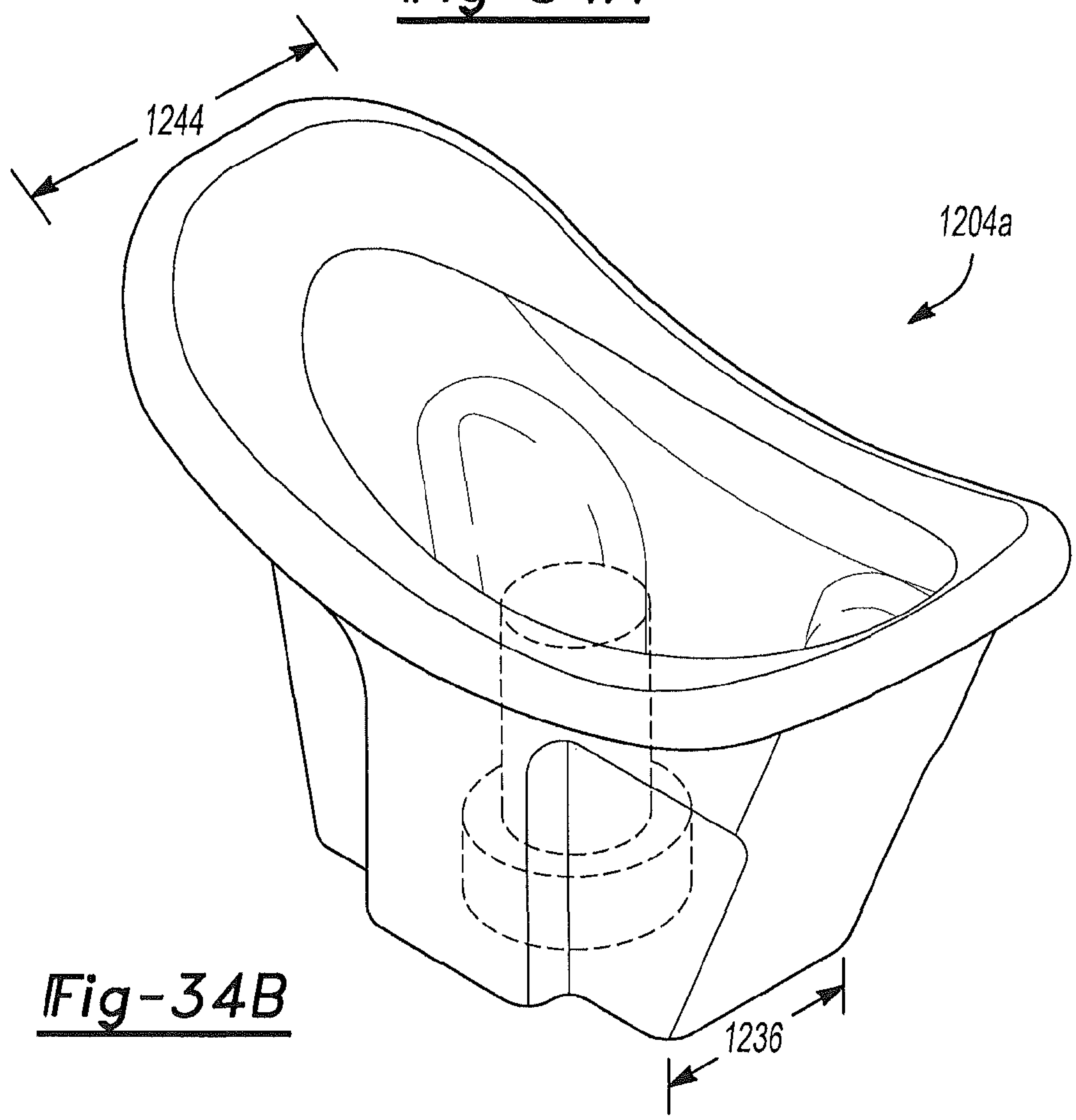

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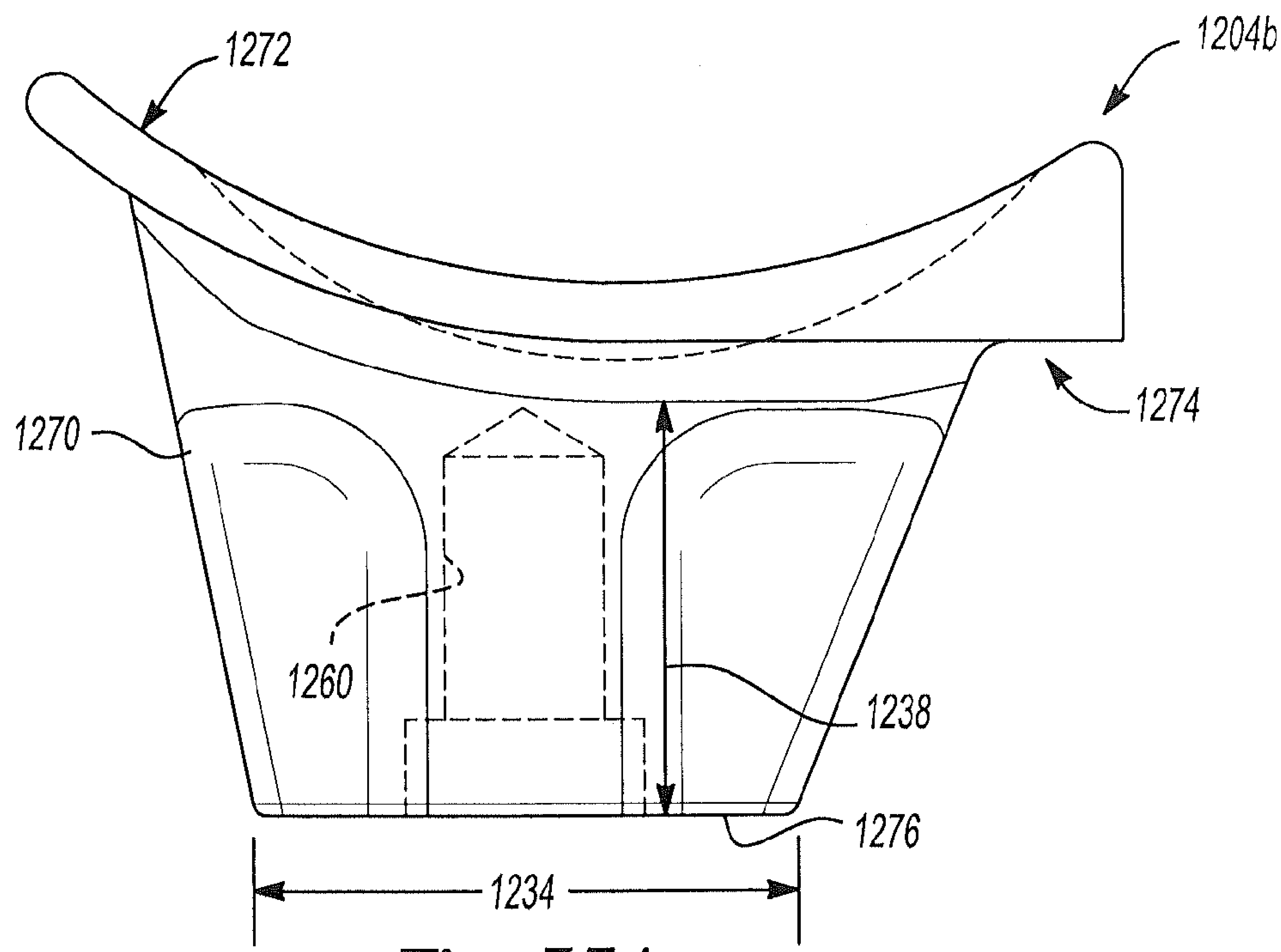

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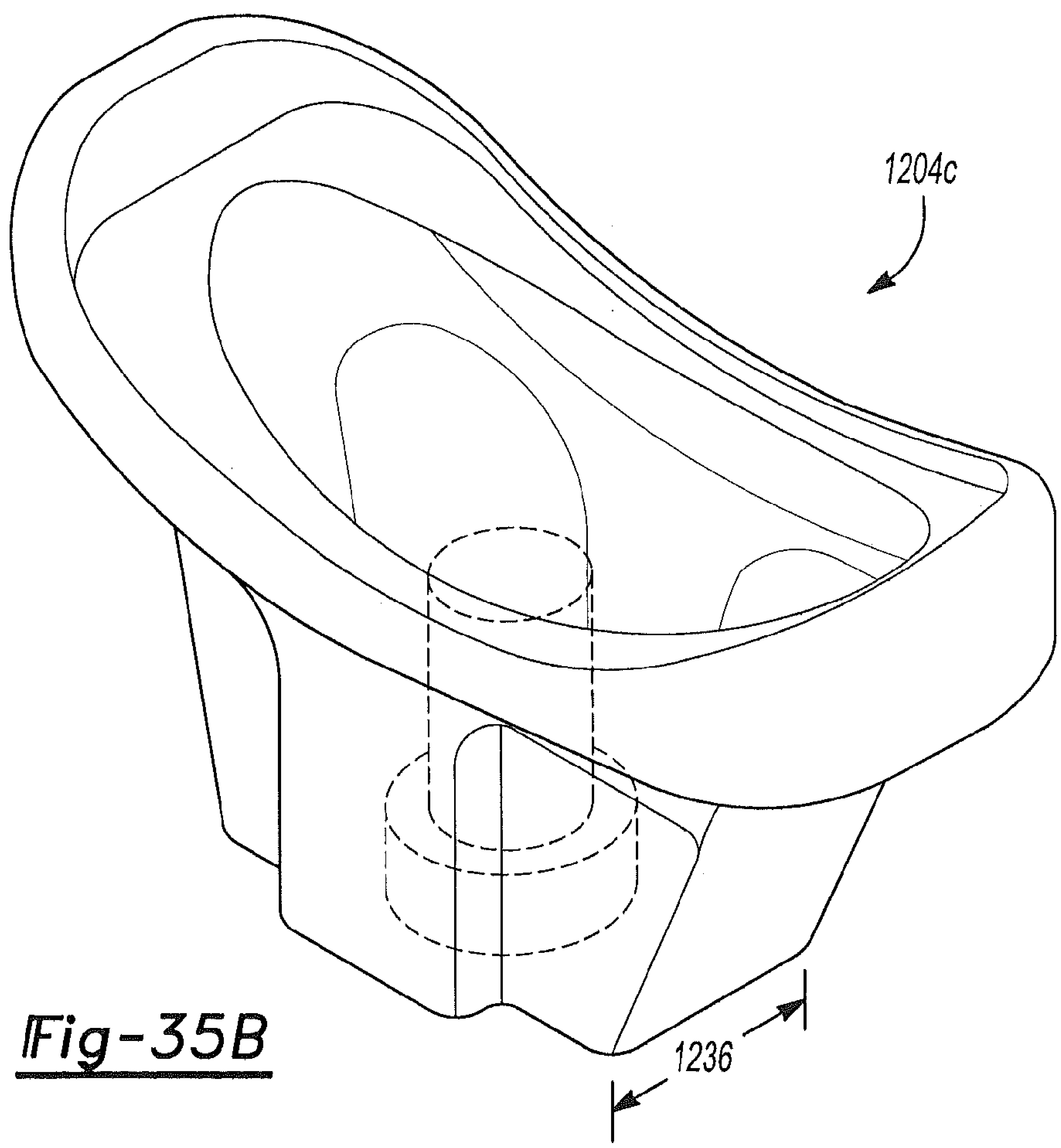

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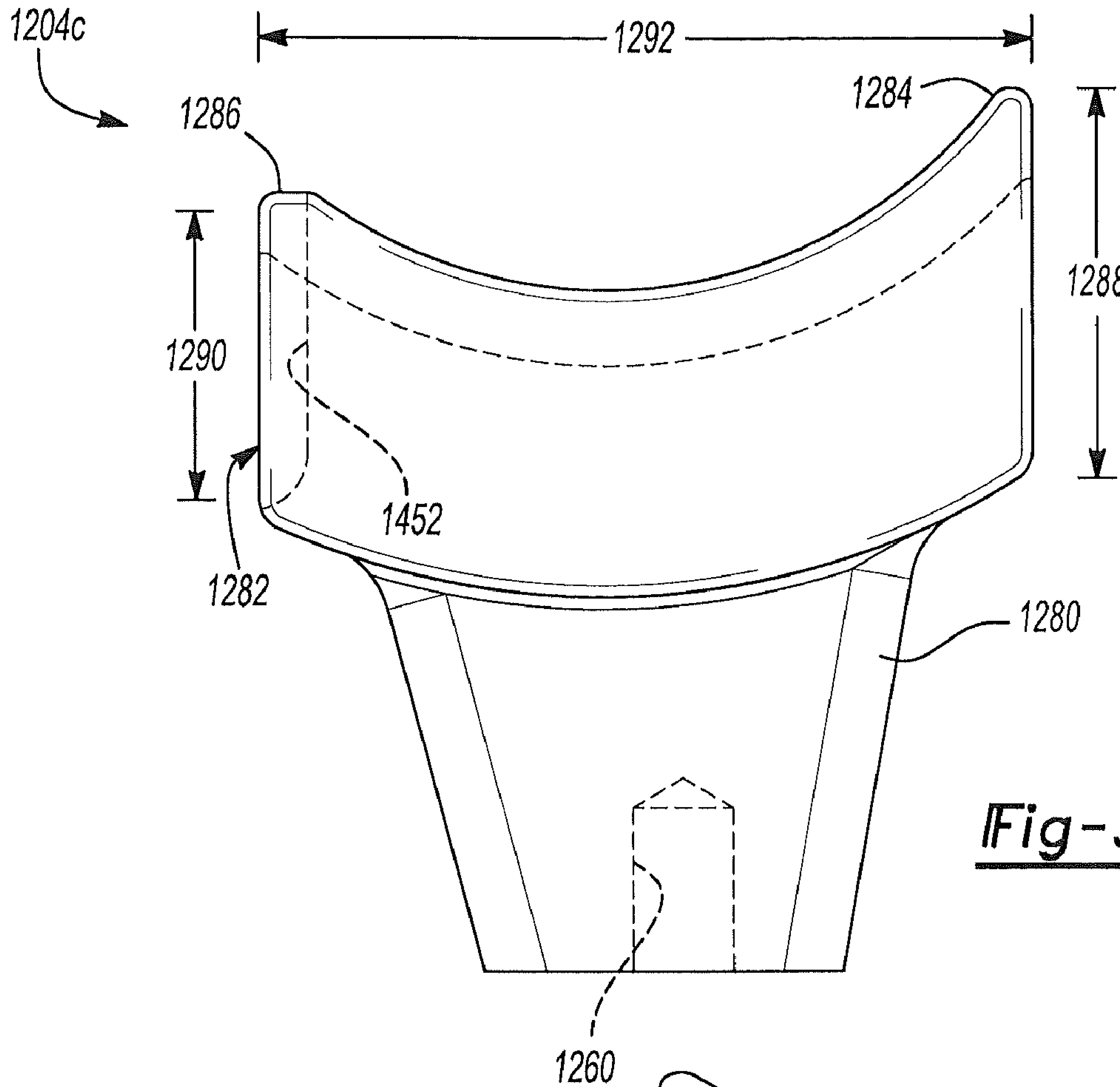

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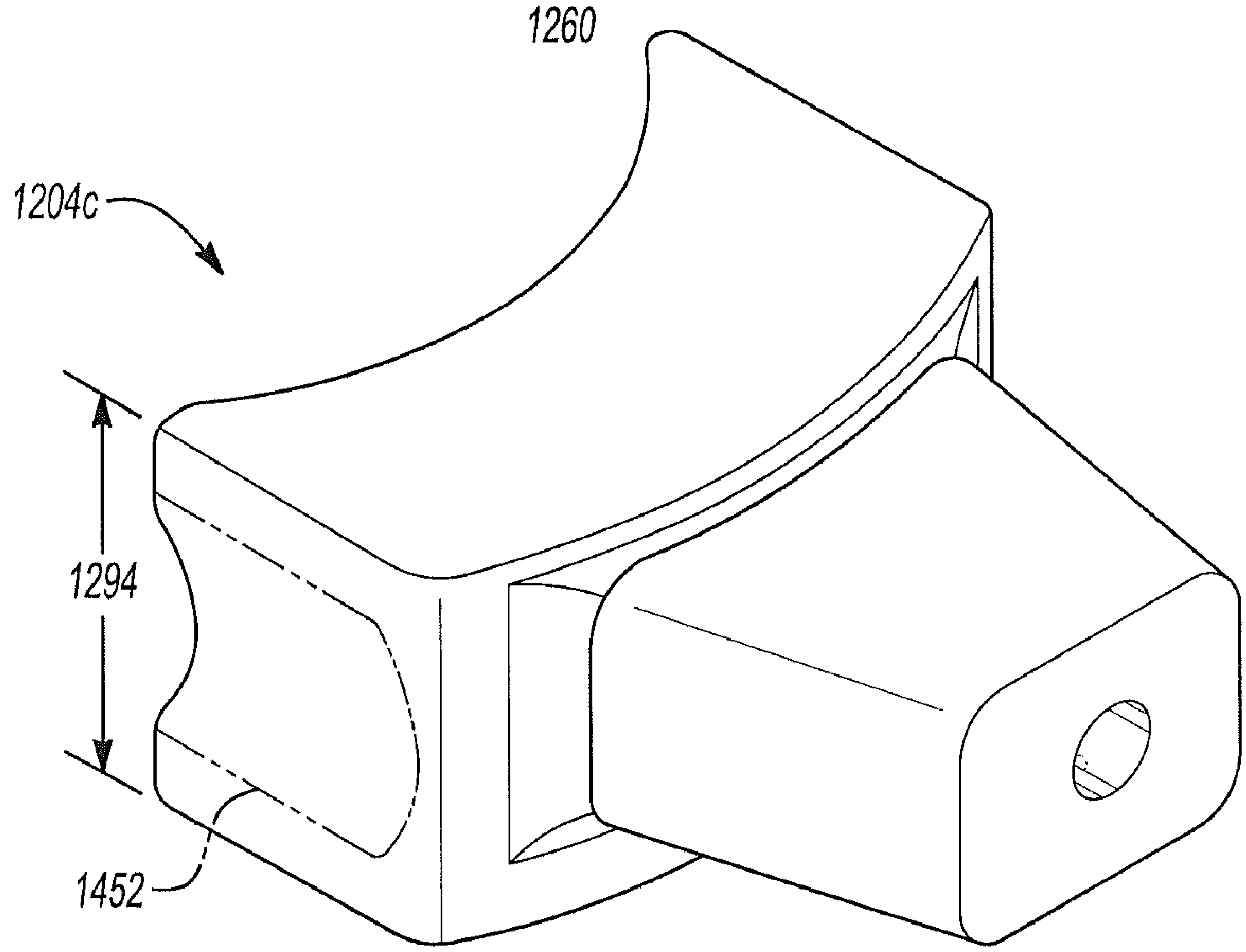

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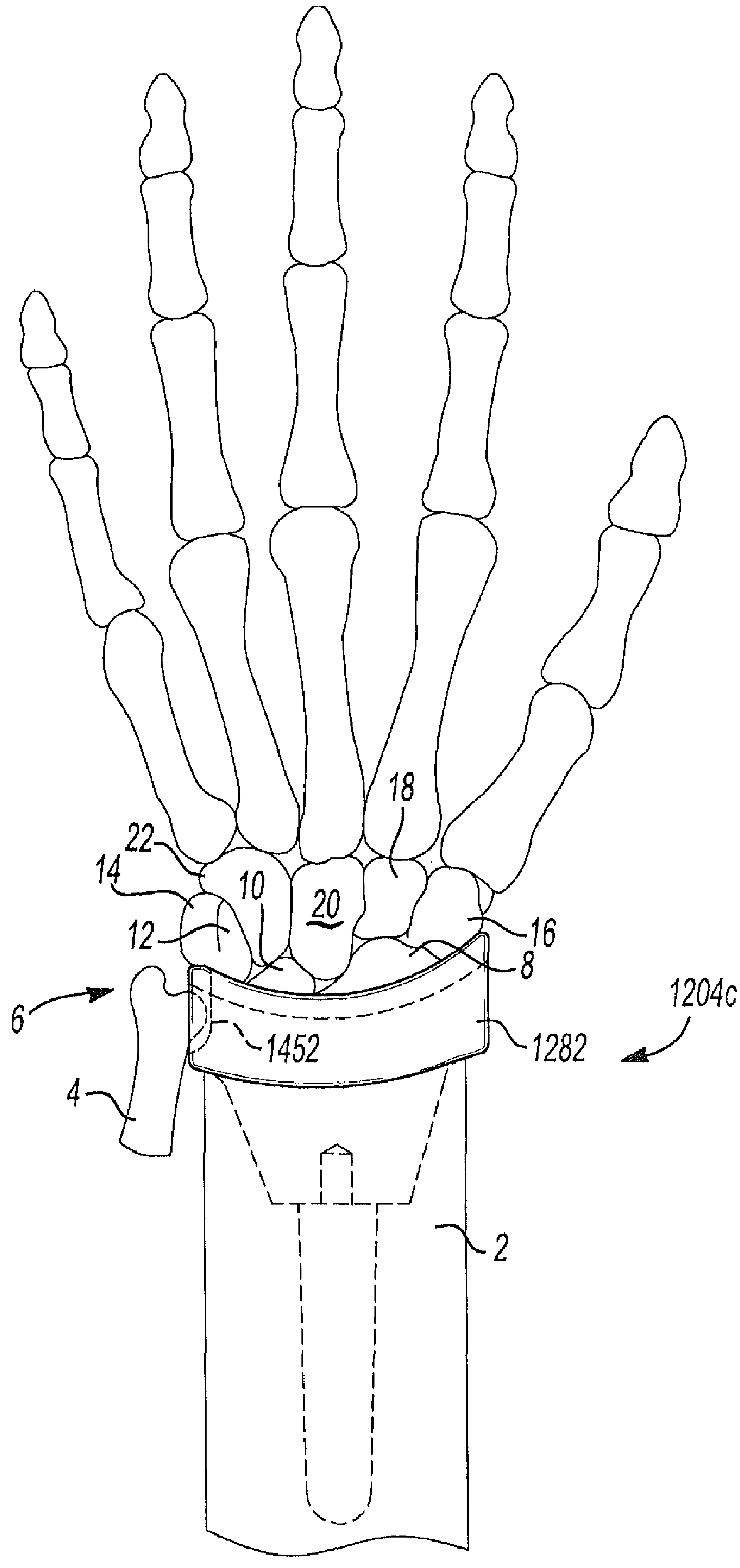

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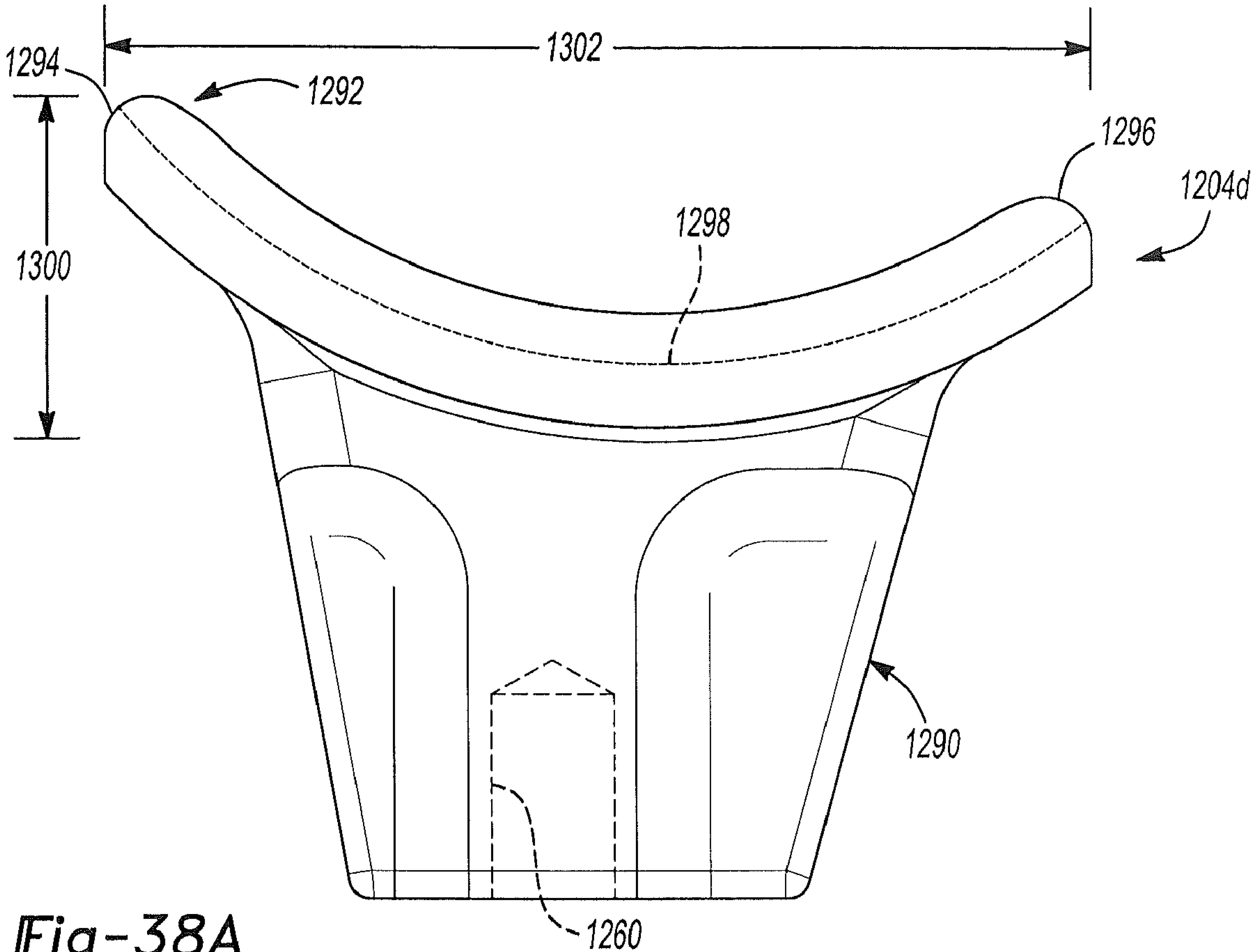

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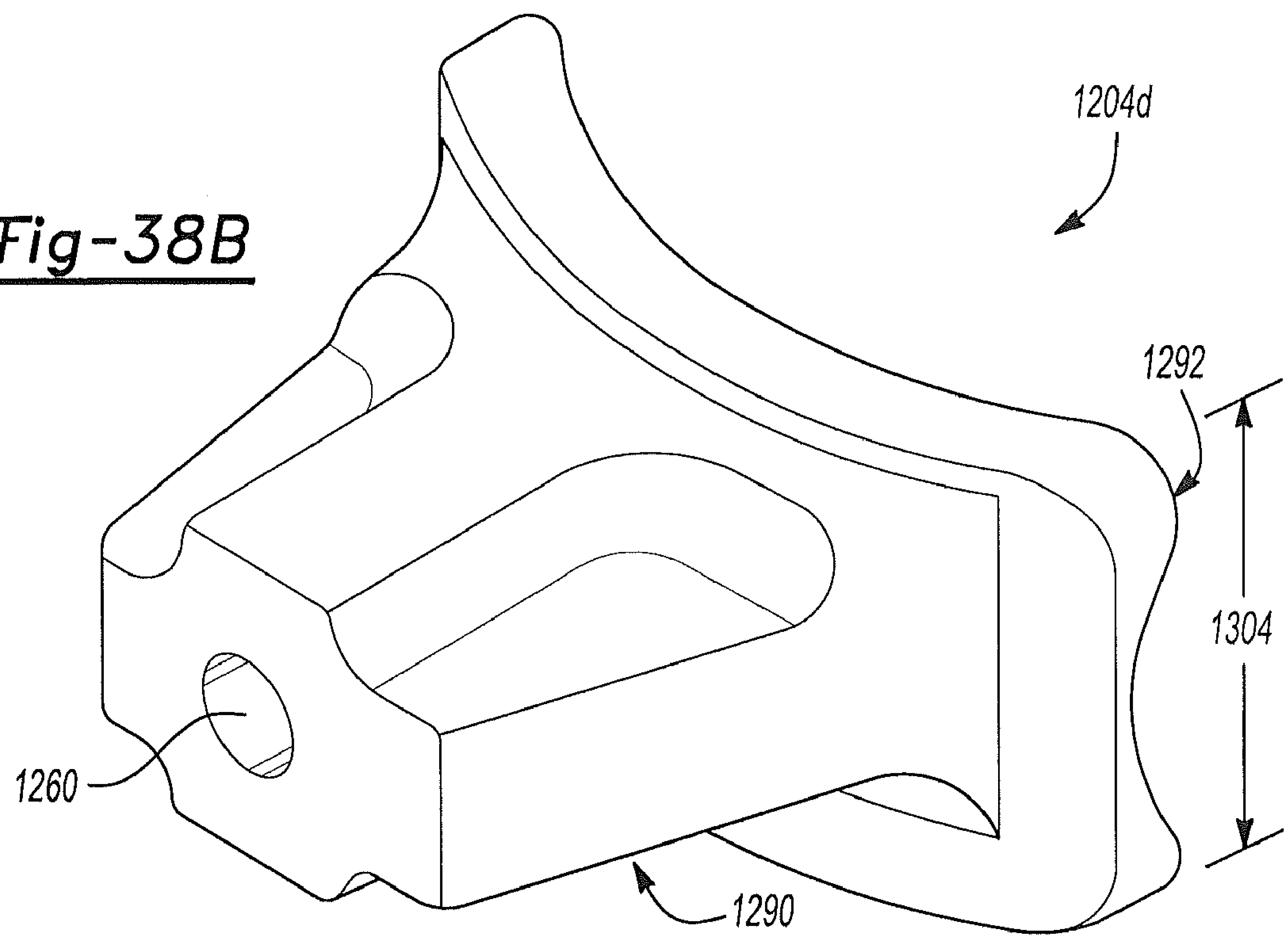
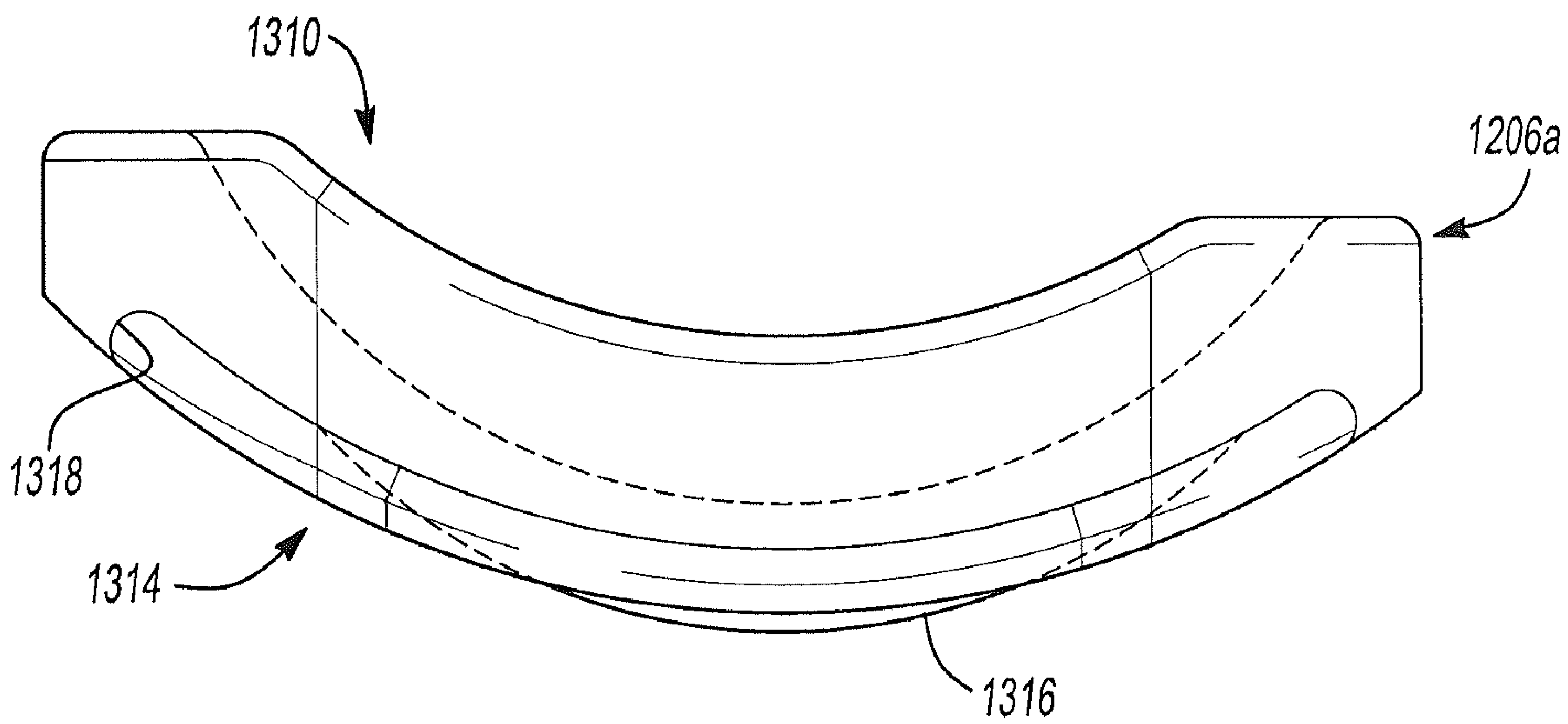
Fig-38B





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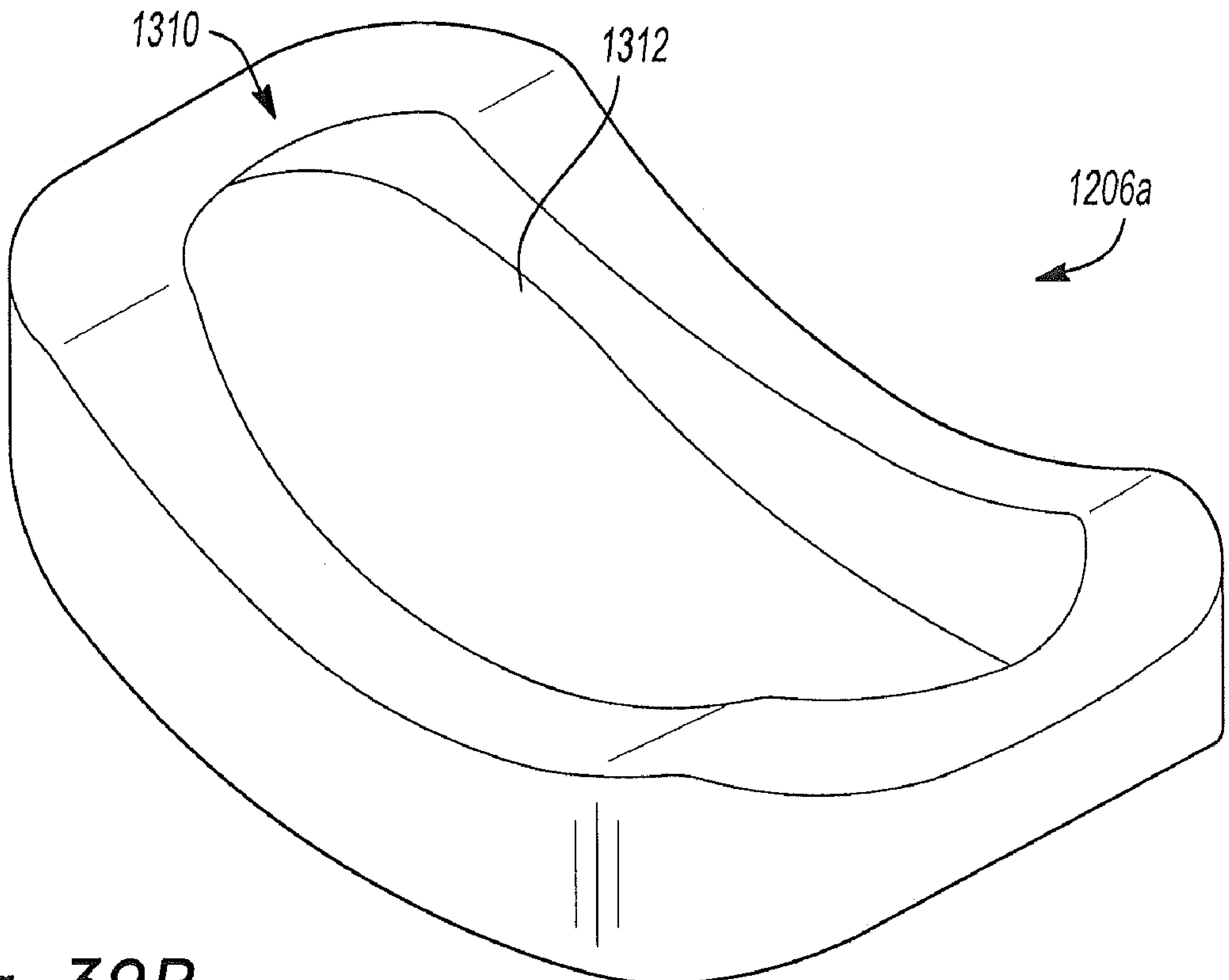

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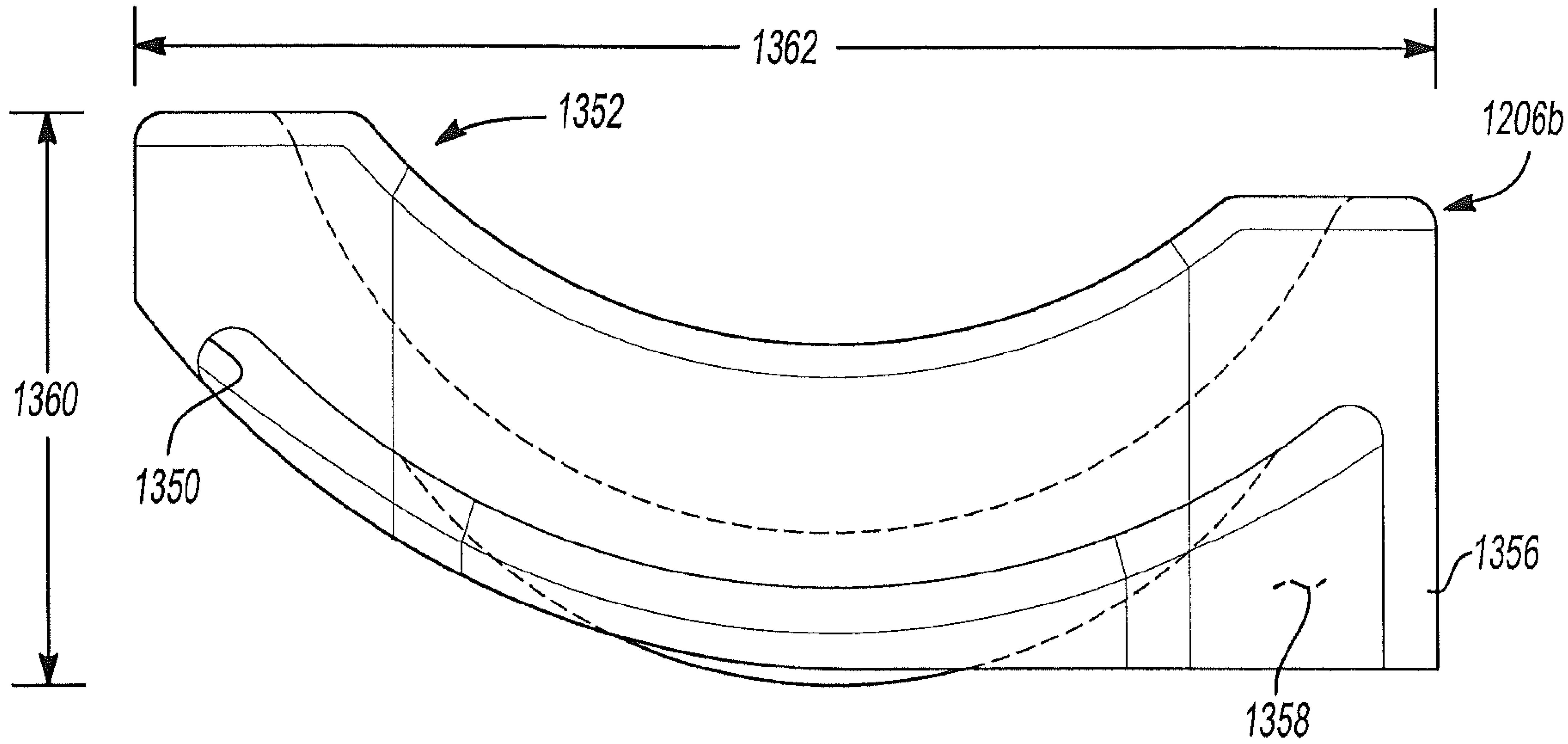


Fig-40A

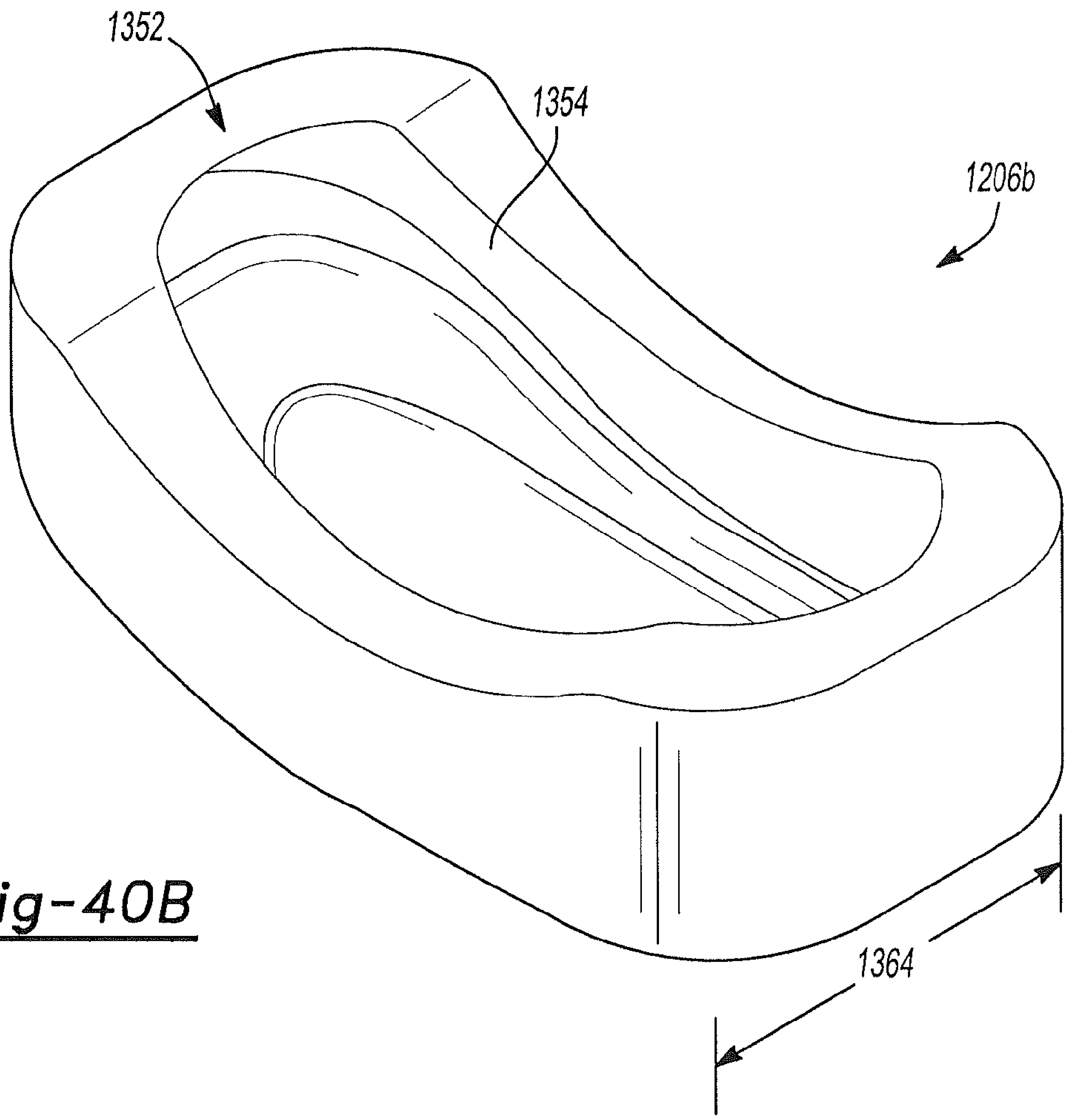
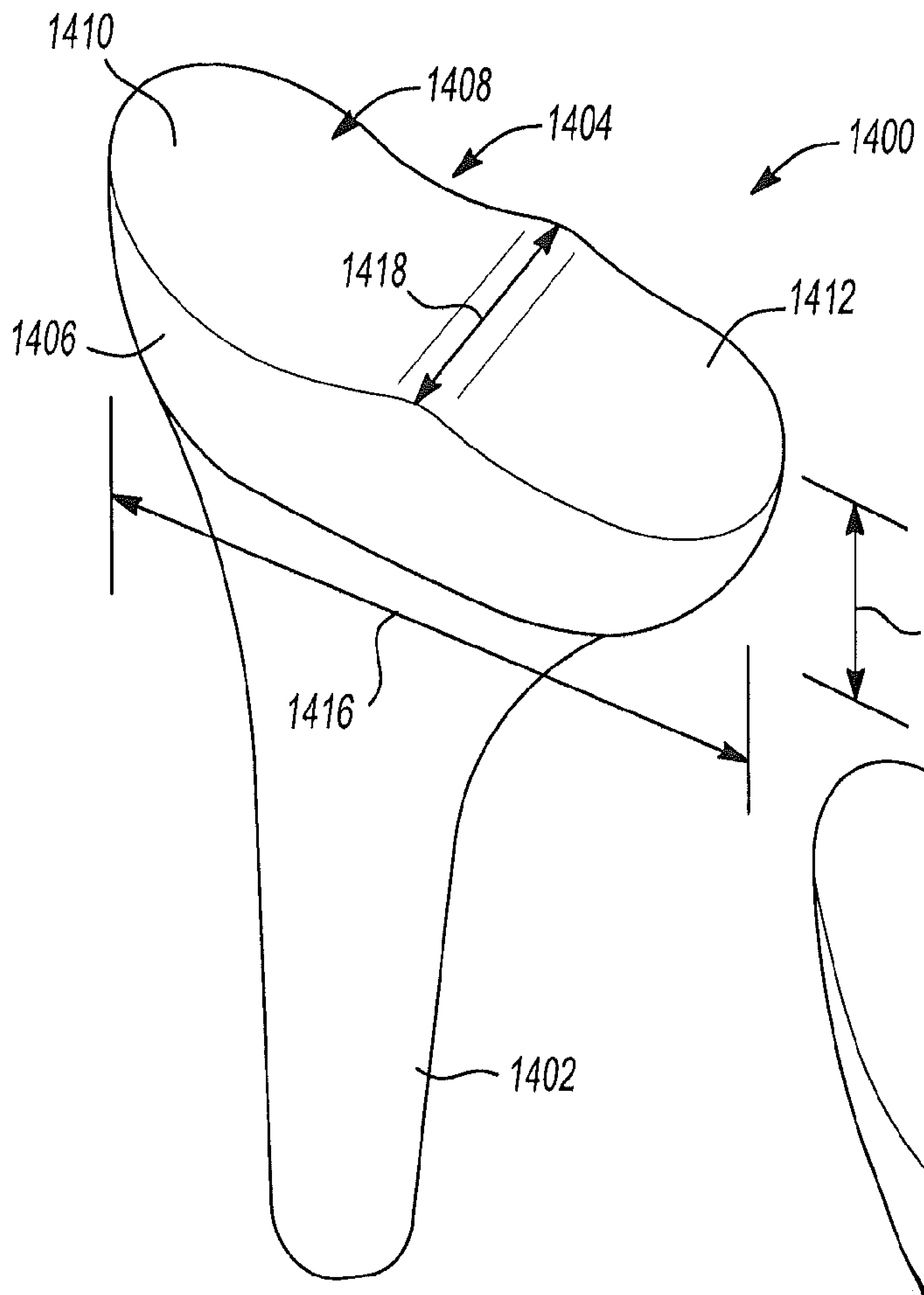


Fig-40B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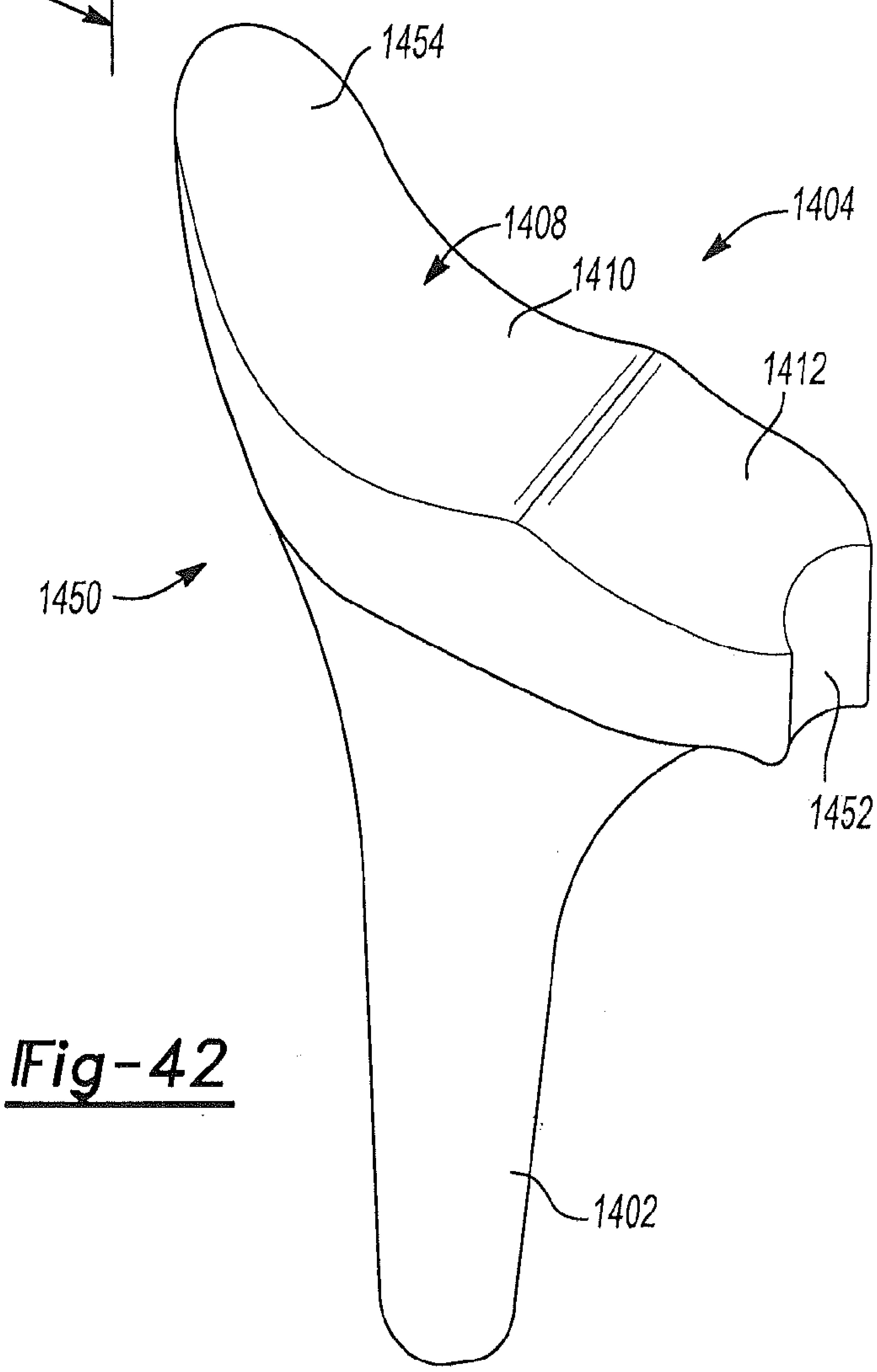
1416
1402

Fig-41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1410
1412
1450
1452
1402

Fig-42

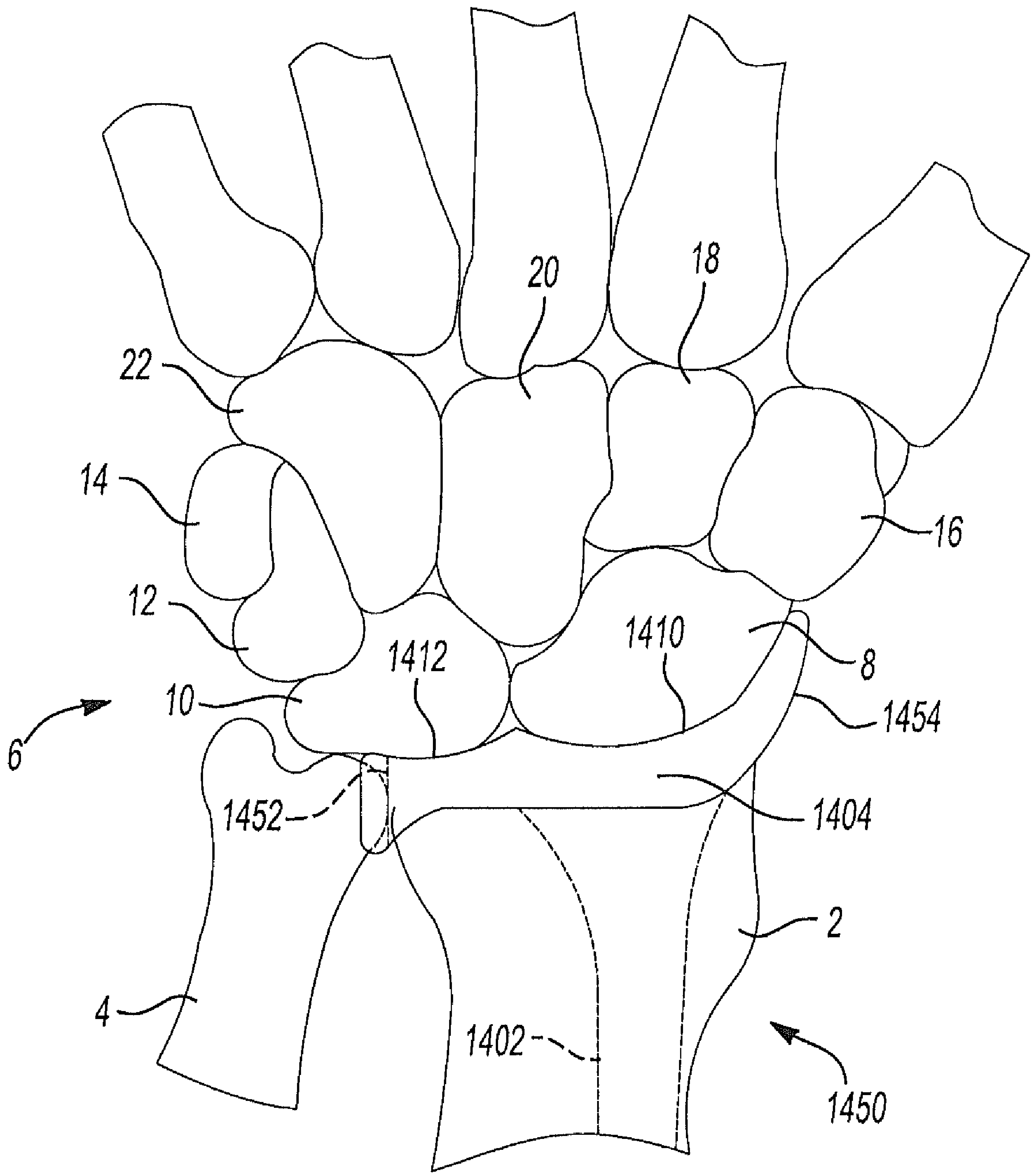
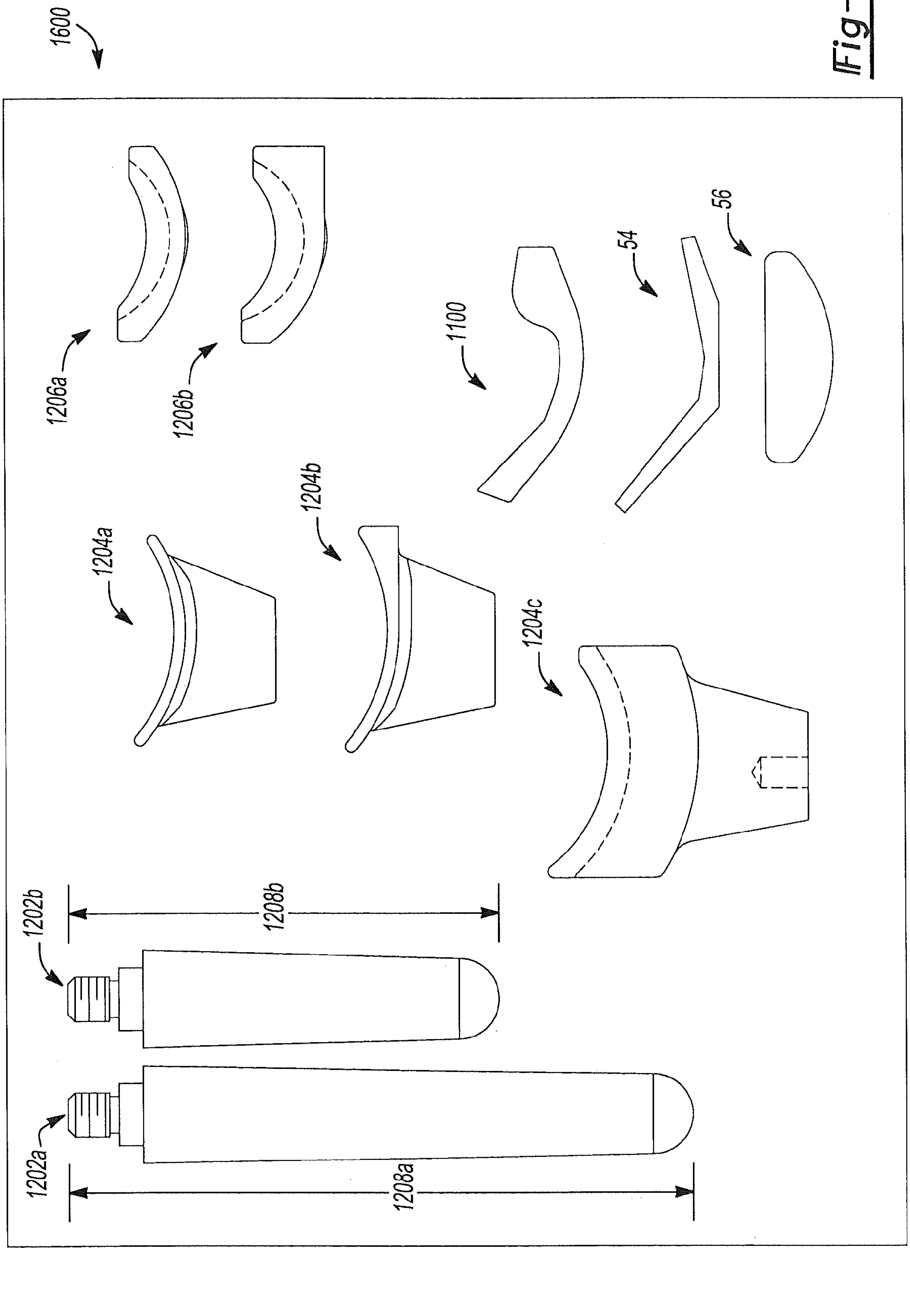


Fig-43

Fig-44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56
1204a
1204b
1204c
1202b
1208b
1202a
1208a

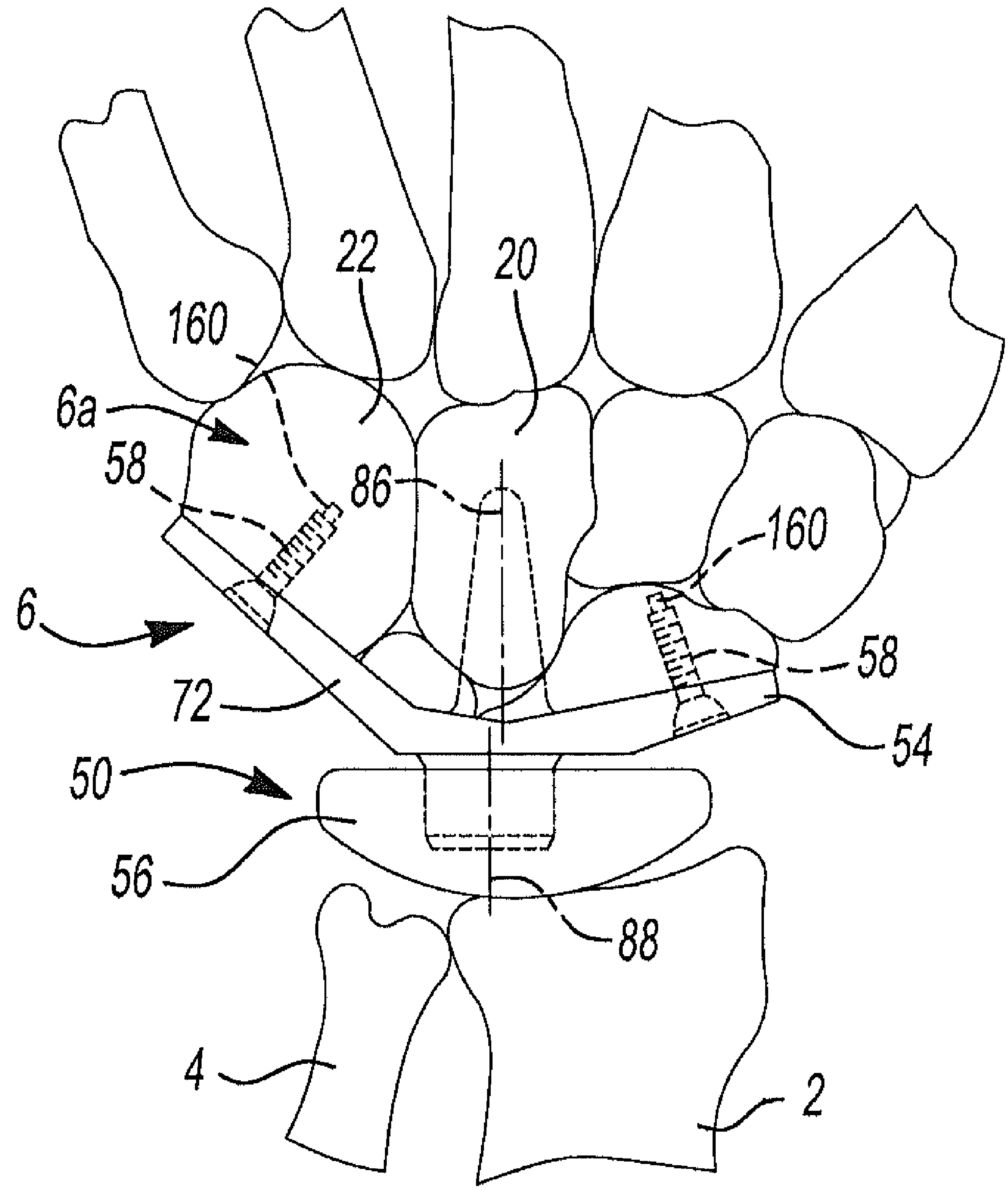
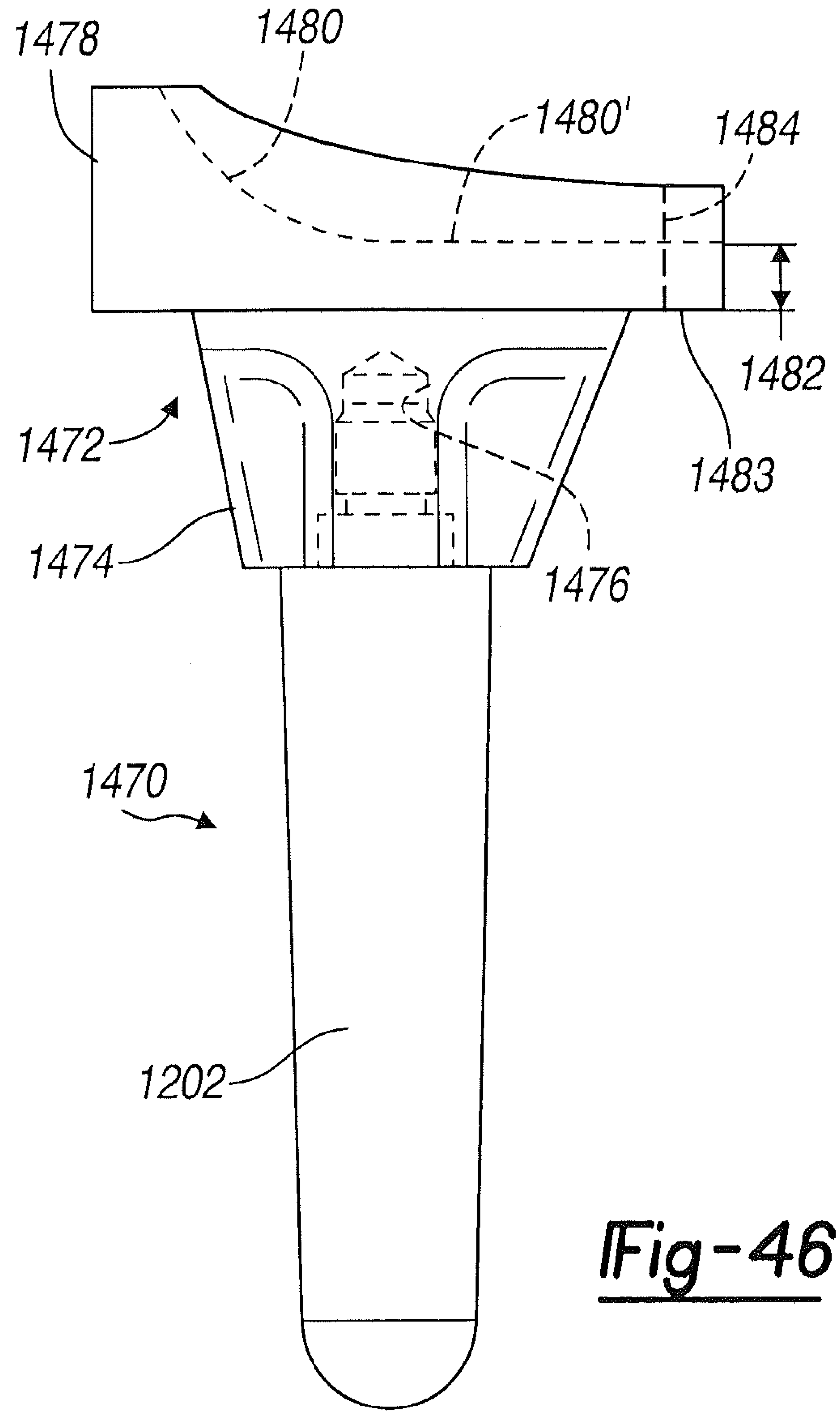


Fig-45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1480'
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1482
1483
1472
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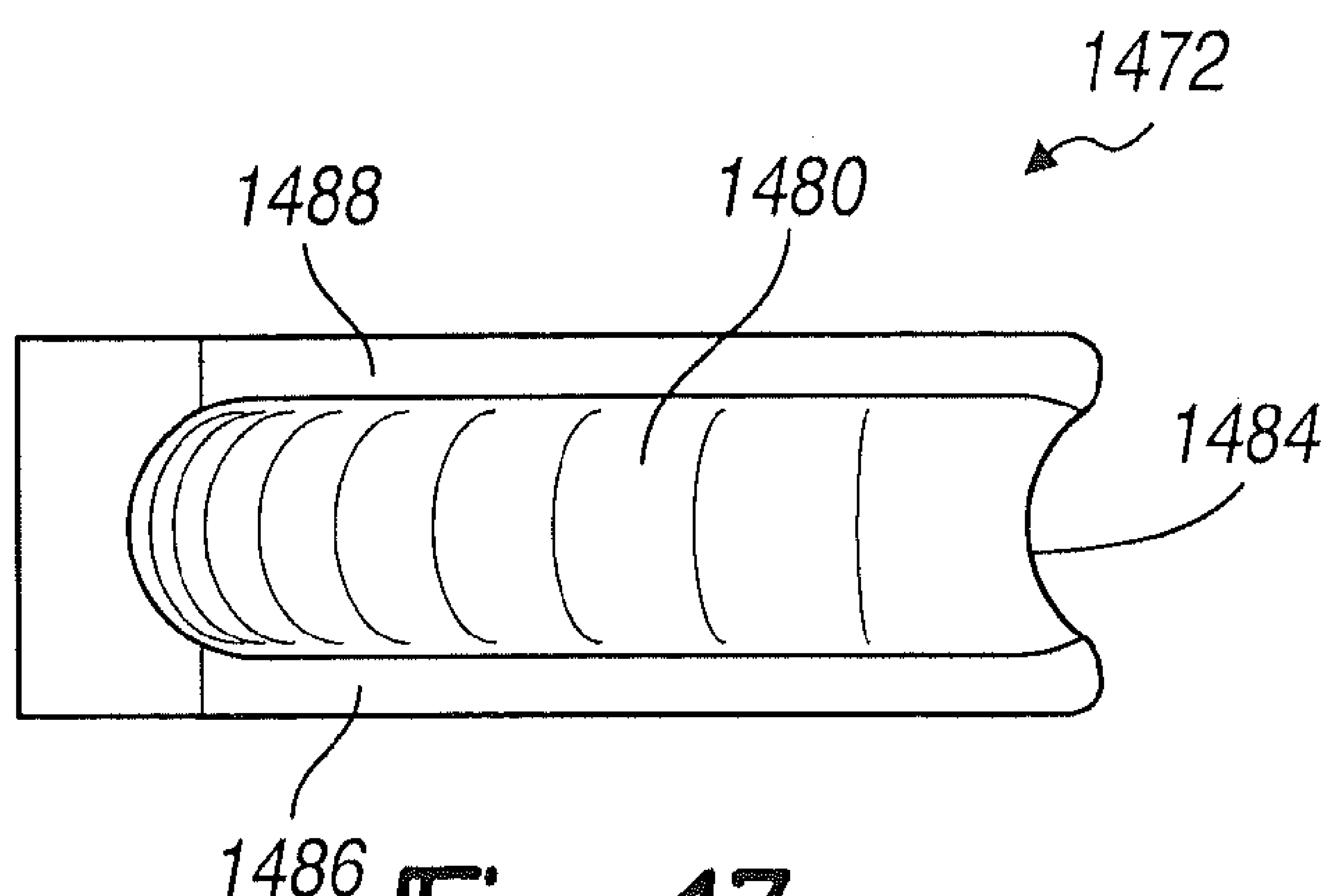
1476
1470
1202

Fig-46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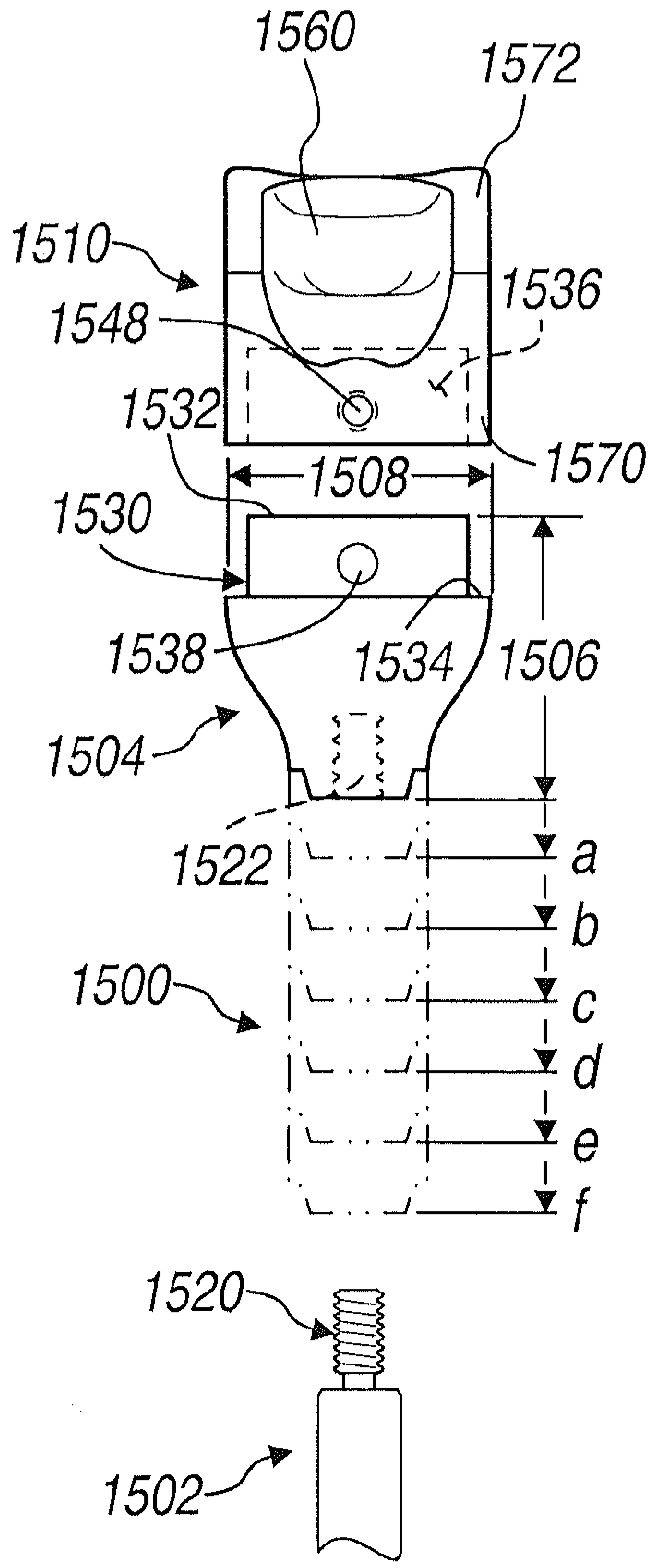
1480
1484
1486

Fig-47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1532
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1508
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1534
1506
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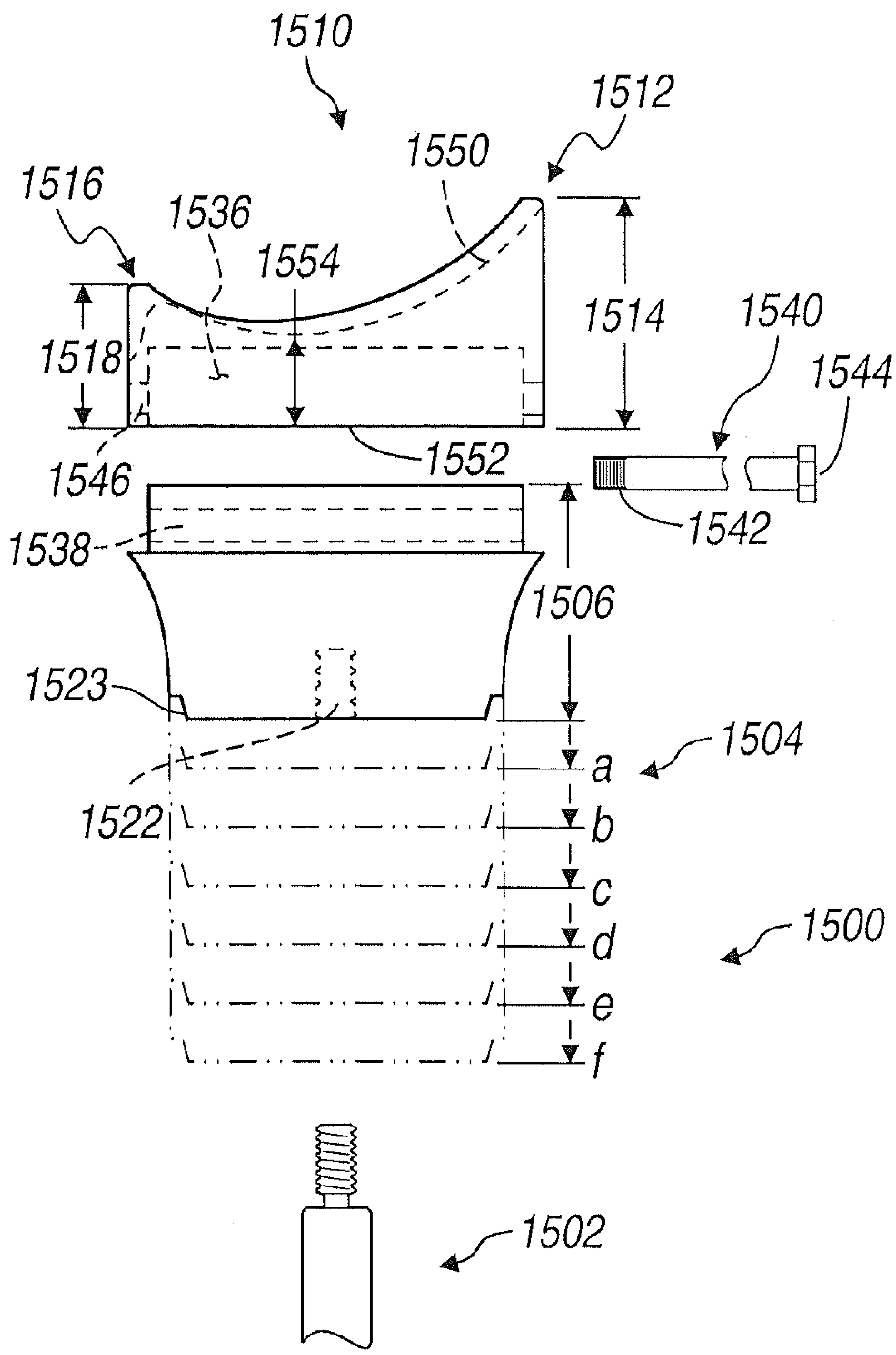
1522
a
b
c
d
e
f
1500
1520
1502

Fig-48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b
c
d
1500
e
f
1502

Fig-49

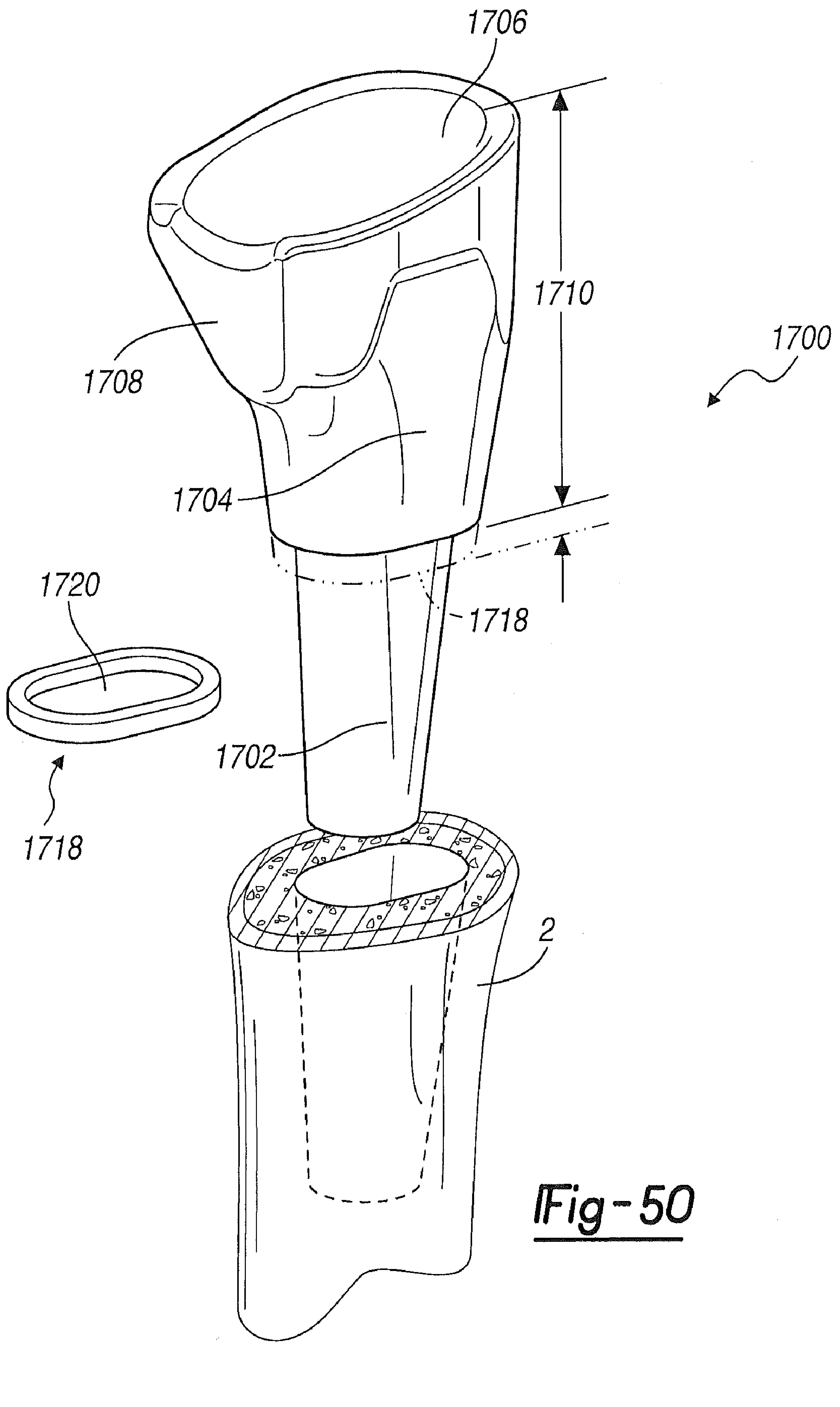
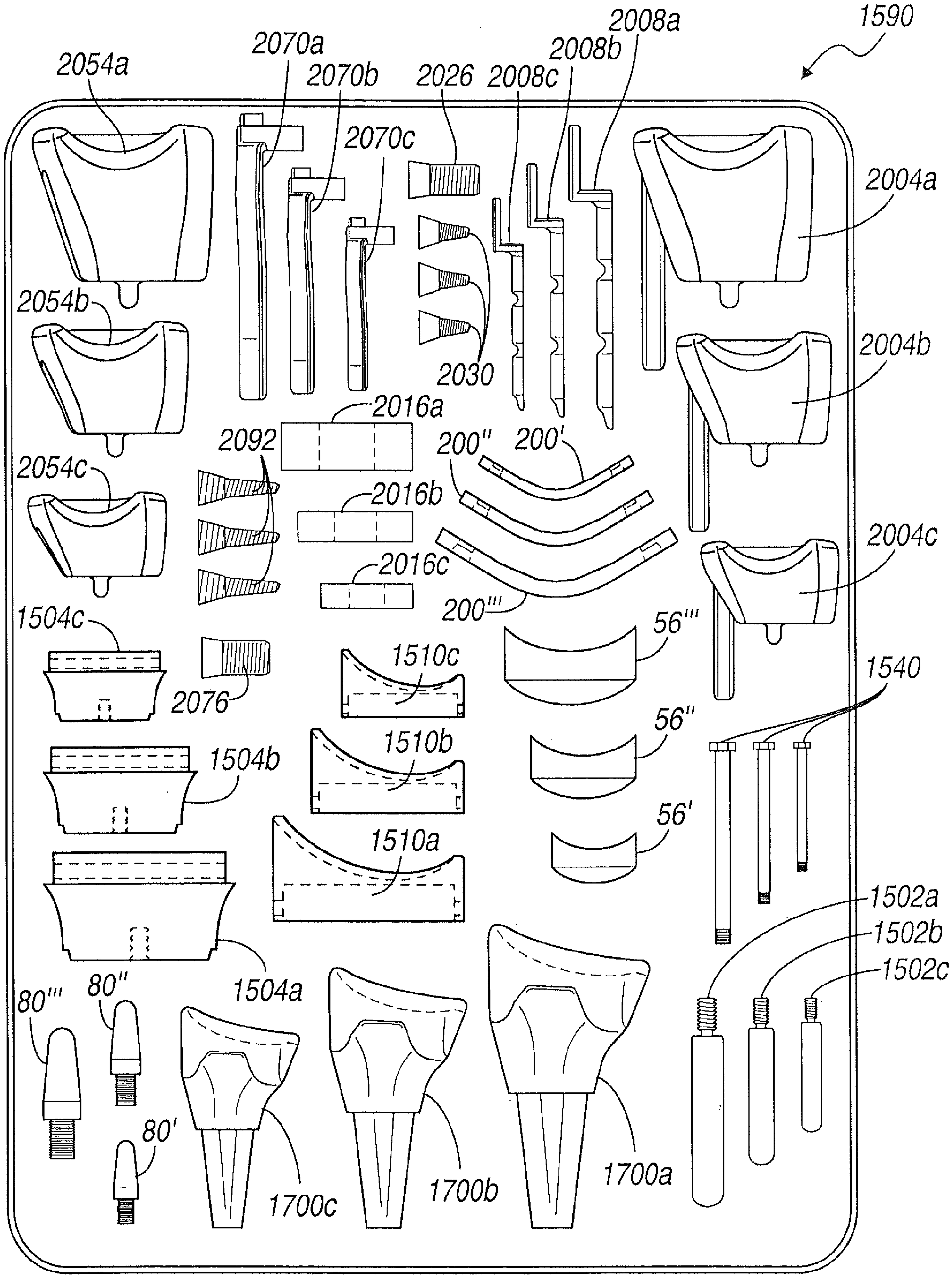


Fig-50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2054a
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2026
2008c
2008b
2008a
2070c
2004a
2054b
2030
2004b
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2092
200''
200'
2054c
2016b
2004c
2016c
1504c
200'''
56'''
1510c
2076
1540
1510b
56''
1504b
56'
1510a
1502a
1502b
1502c
80'''
80''
1504a
80'
1700a
1700b
1700c

Fig-51

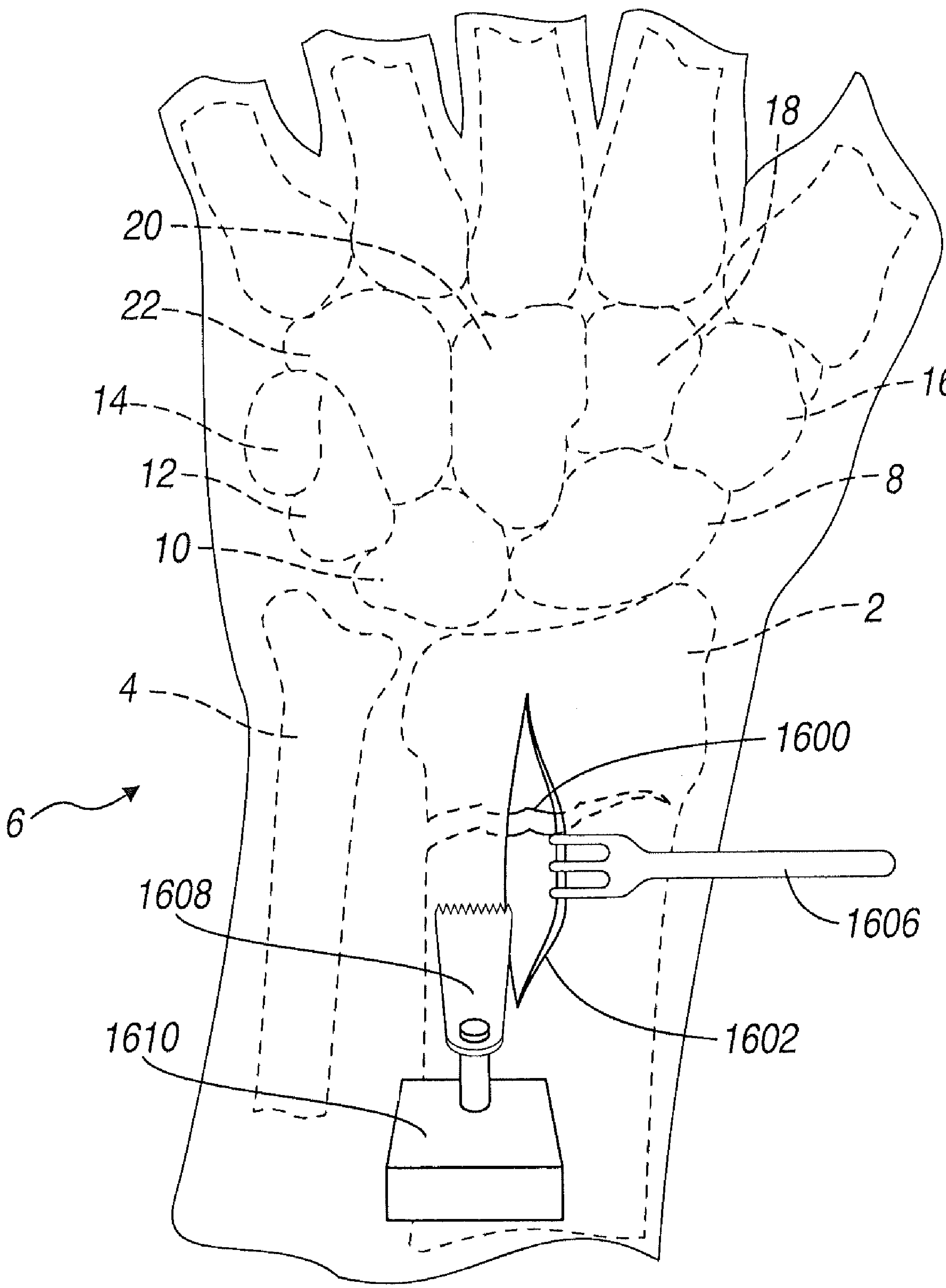


Fig-52

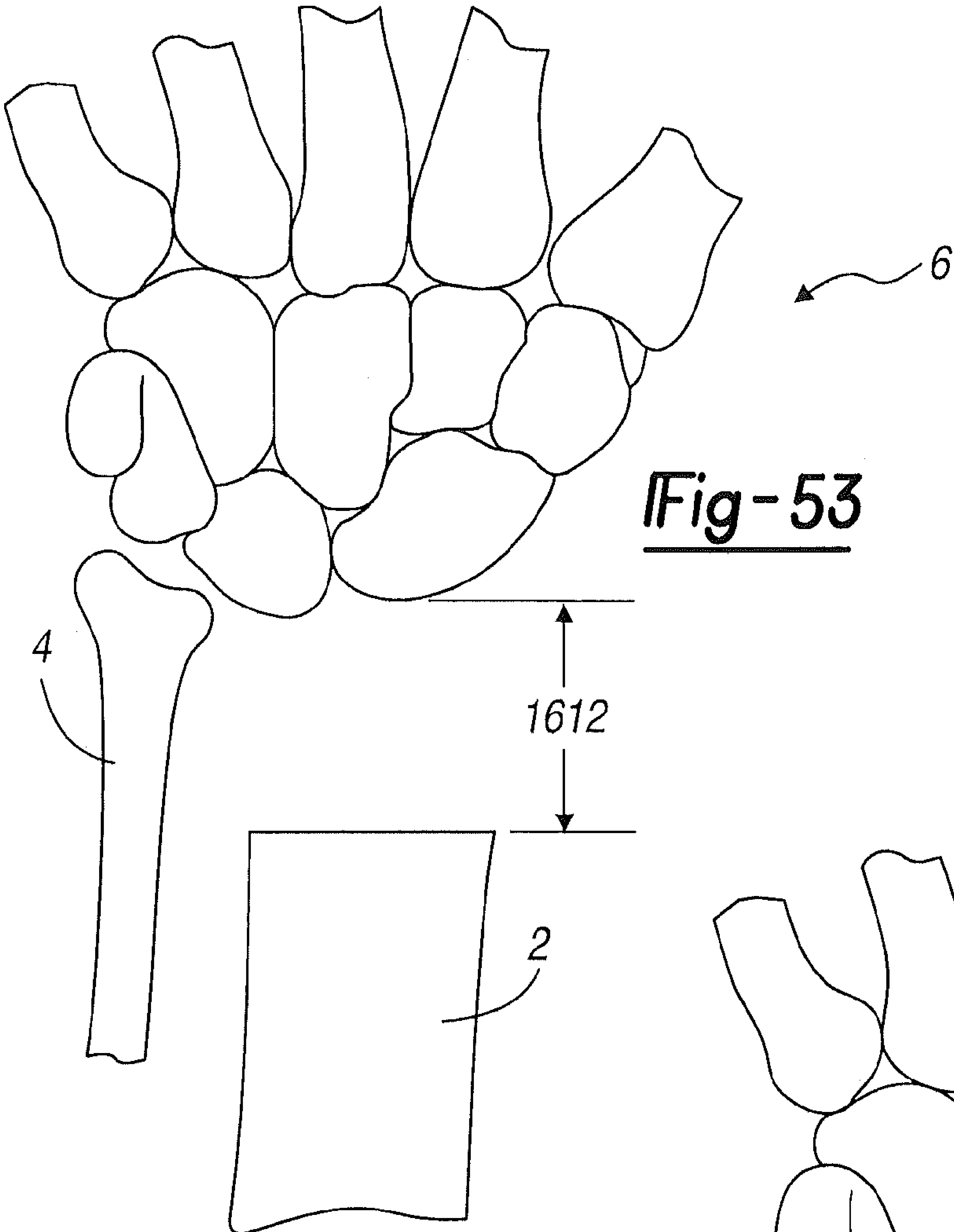


Fig-53

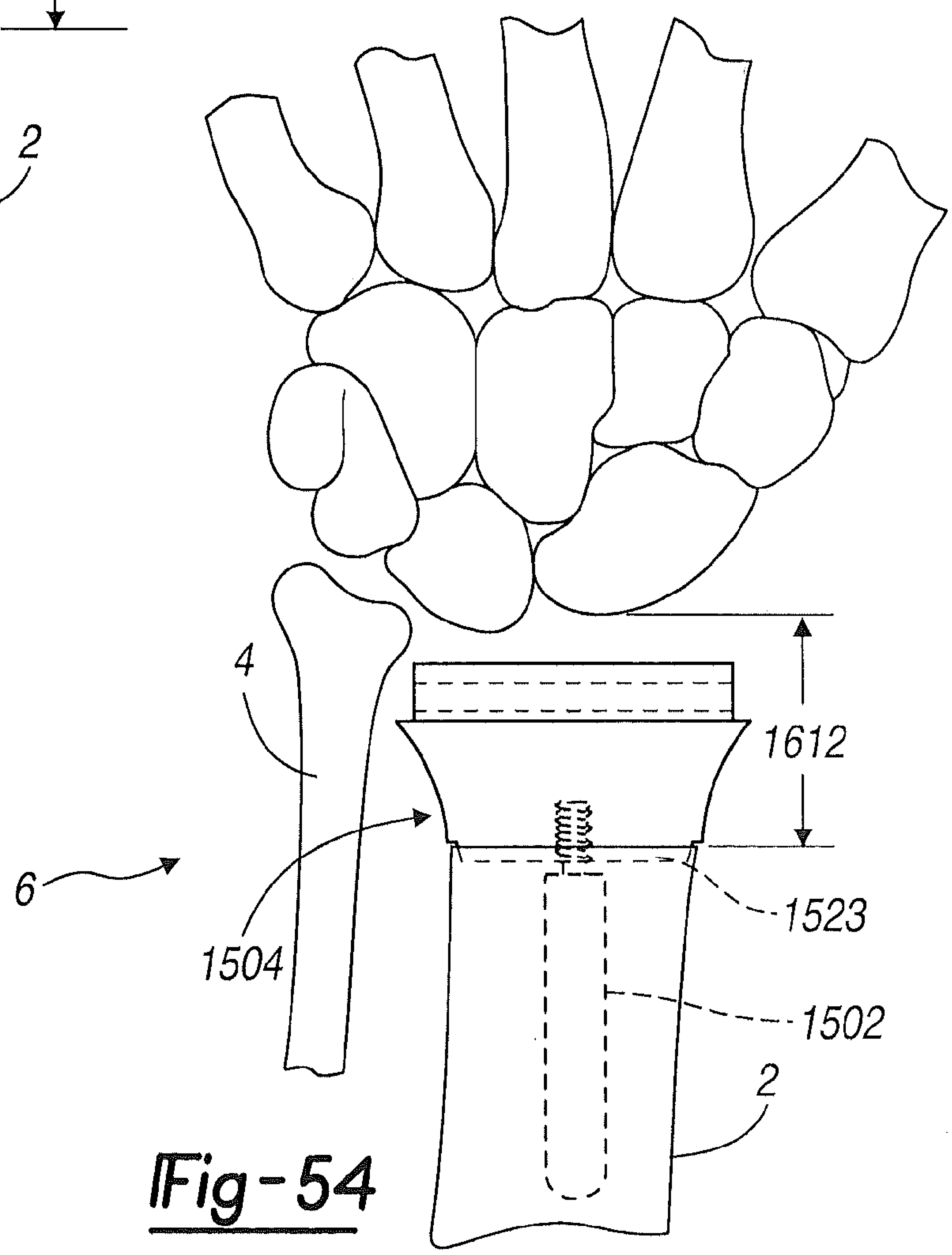


Fig-54

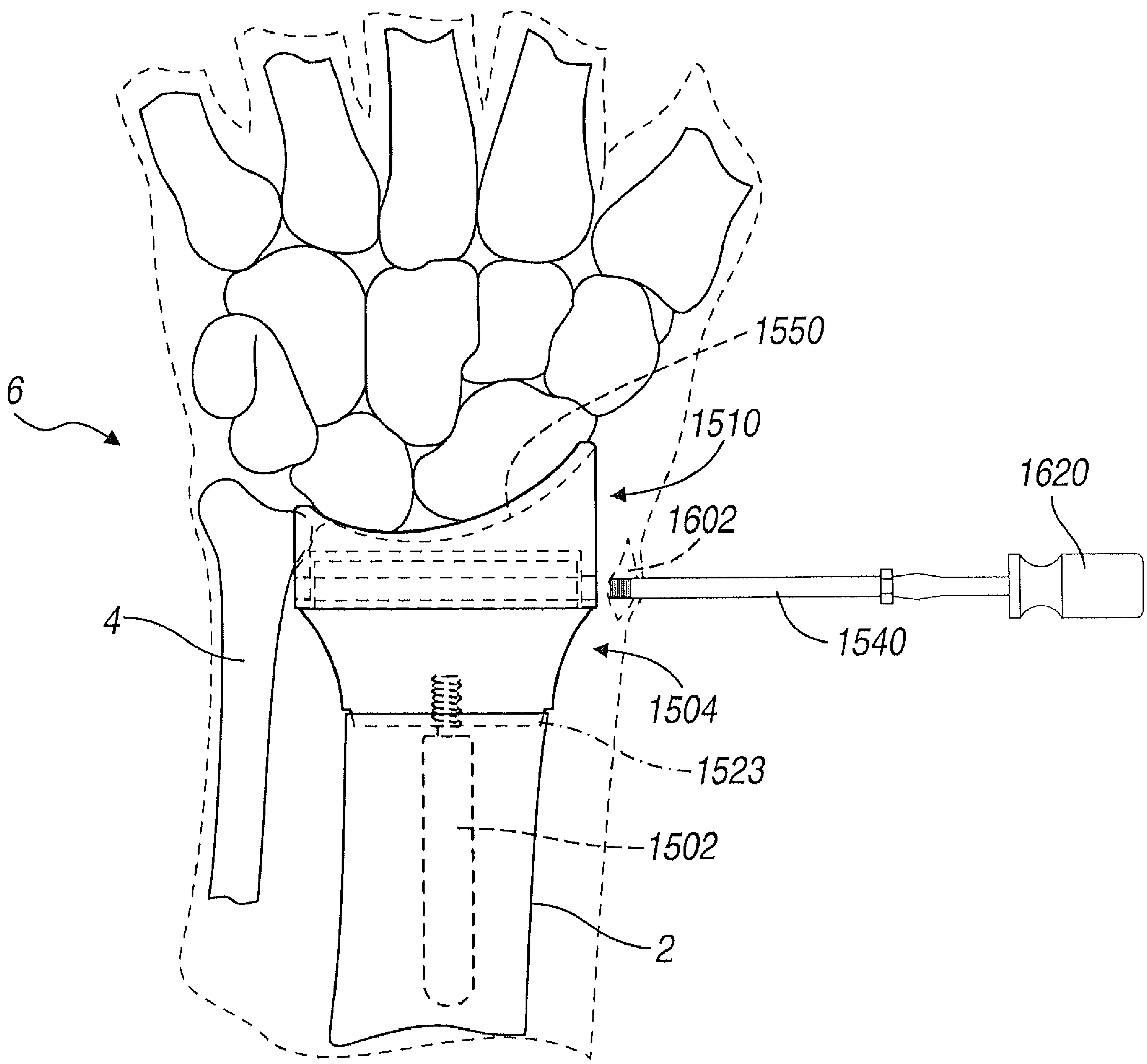
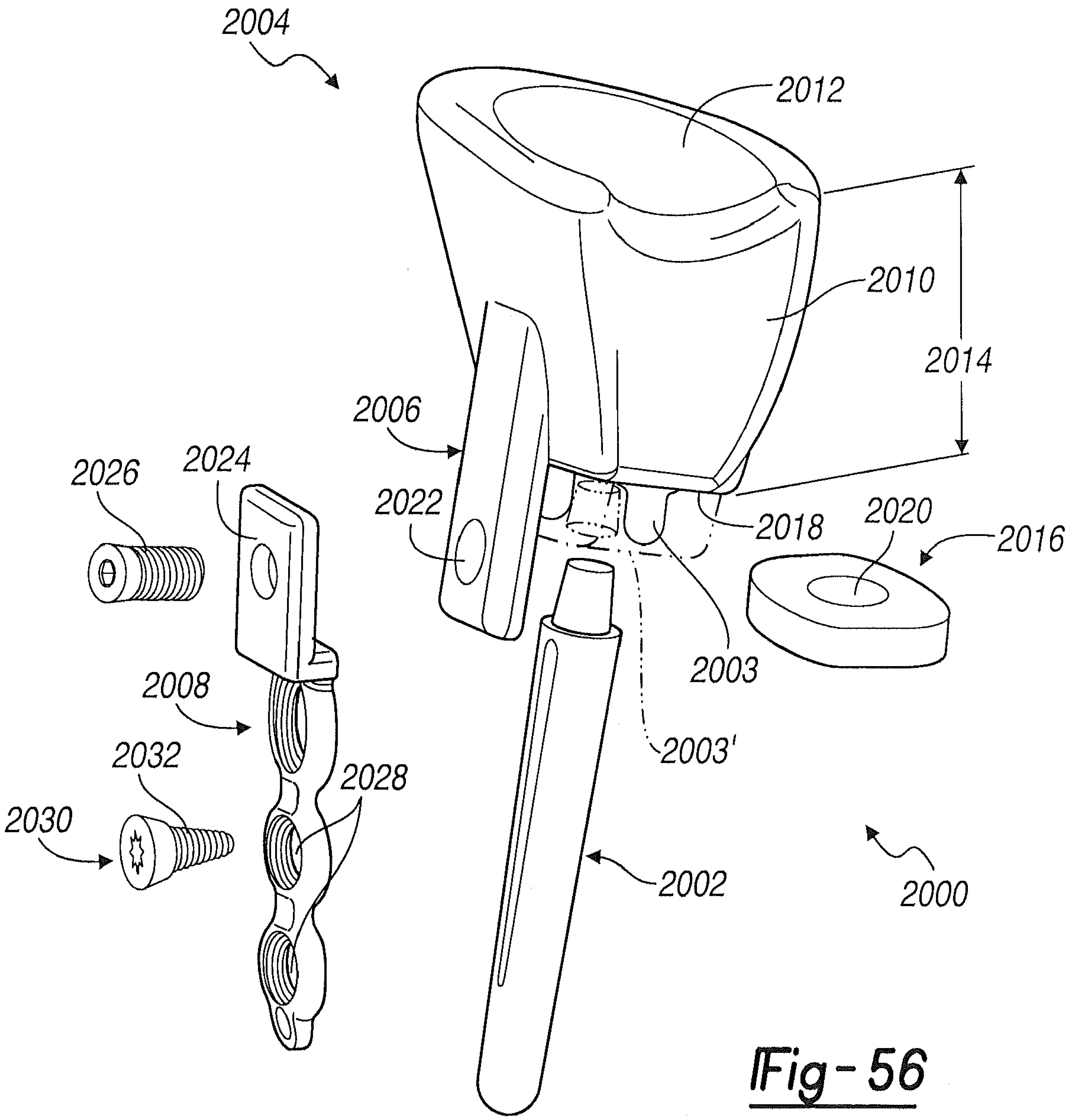


Fig-55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2012
2010
2014
2006
2026
2024
2022
2018
2020
2016
2003
2008
2003'
2032
2028
2030
2002
2000

Fig-56

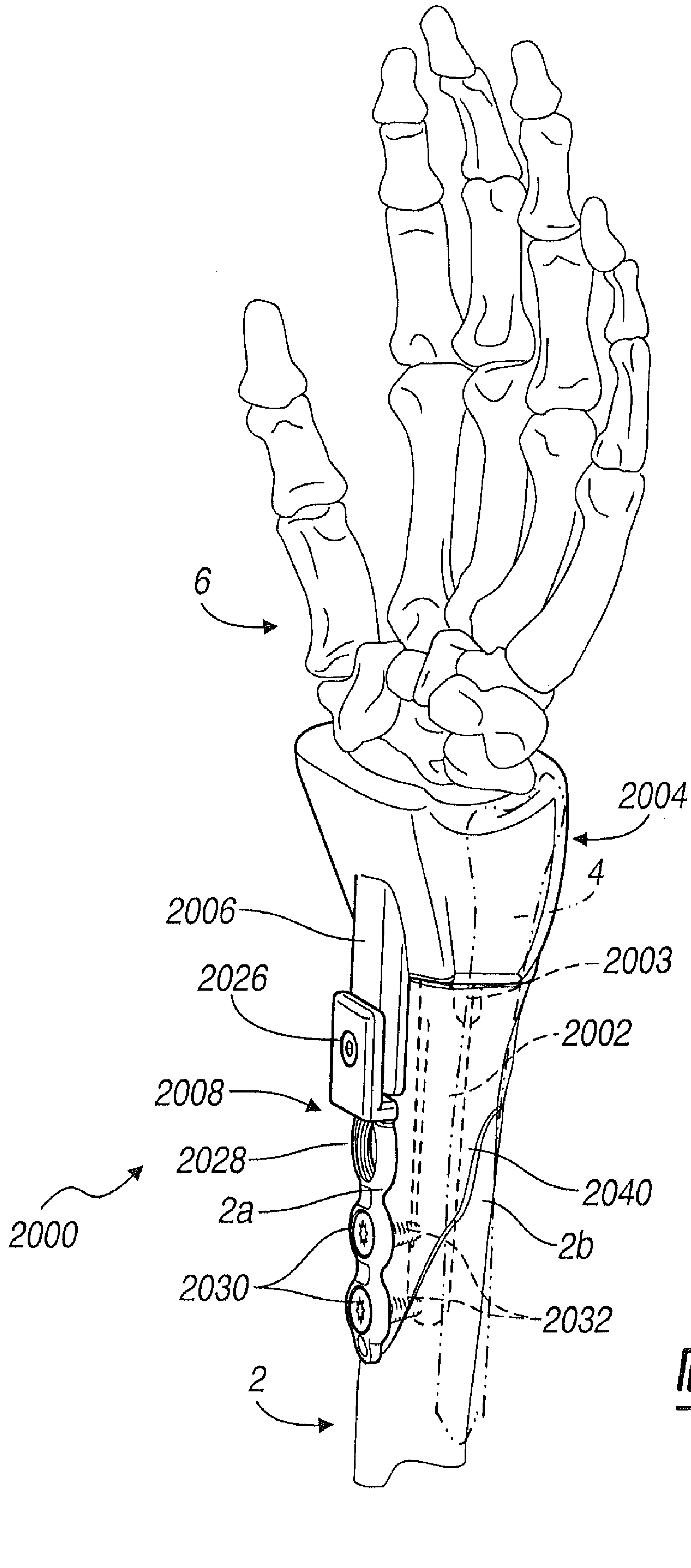

6
2004
4
2006
2003
2026
2002
2008
2028
2040
2000
2a
2b
2030
2032
2

Fig-57

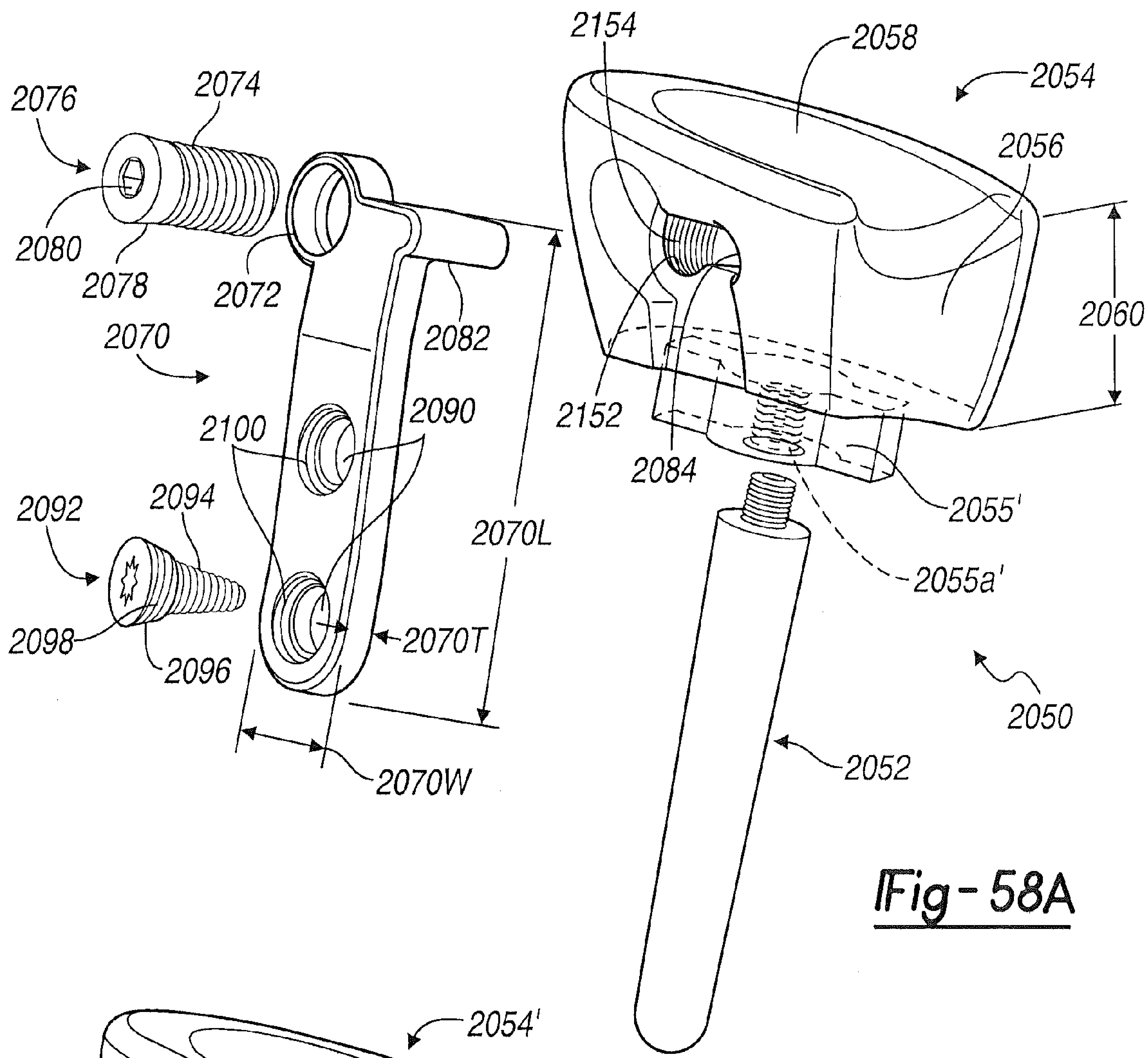


Fig-58A

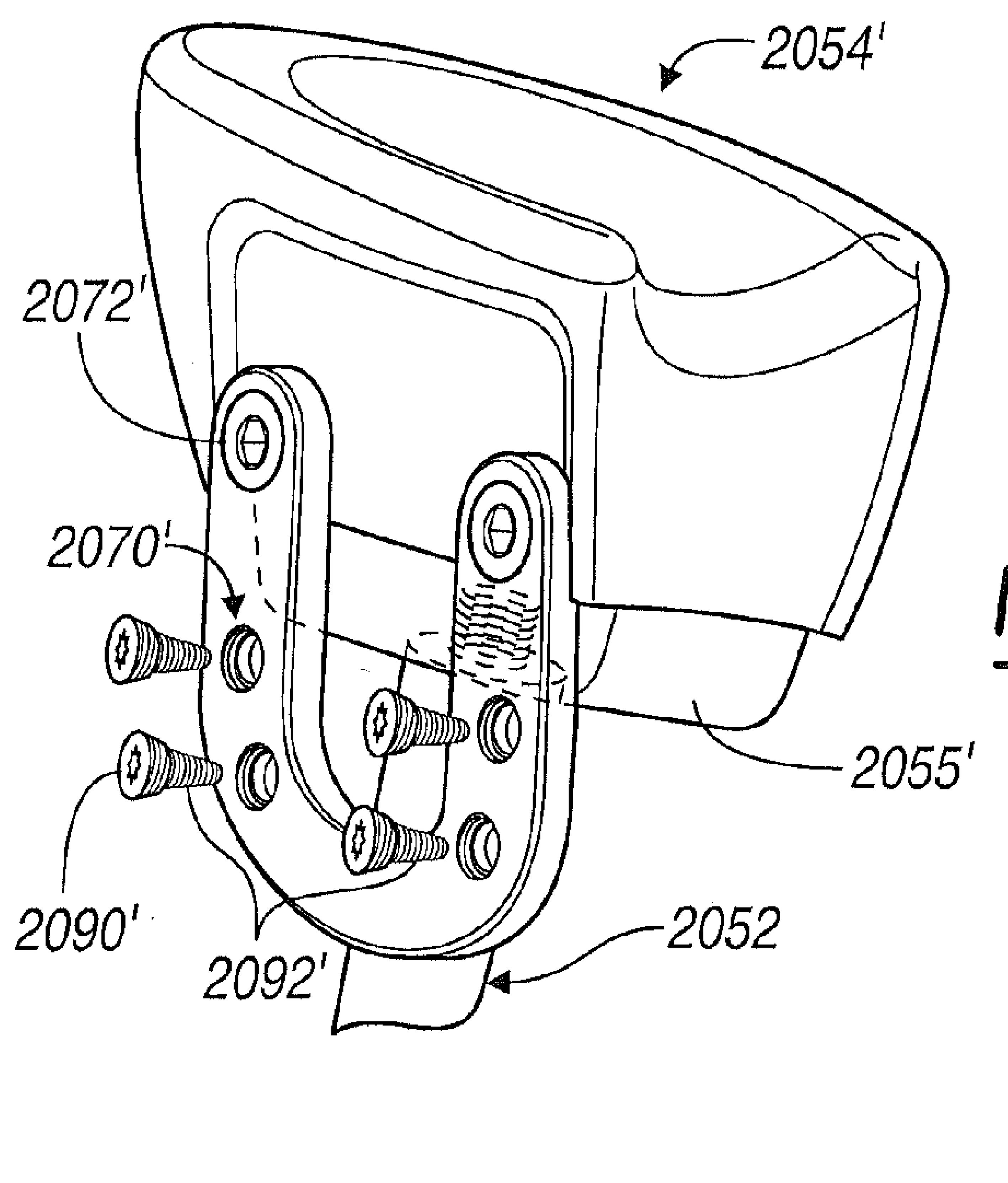


Fig-58B

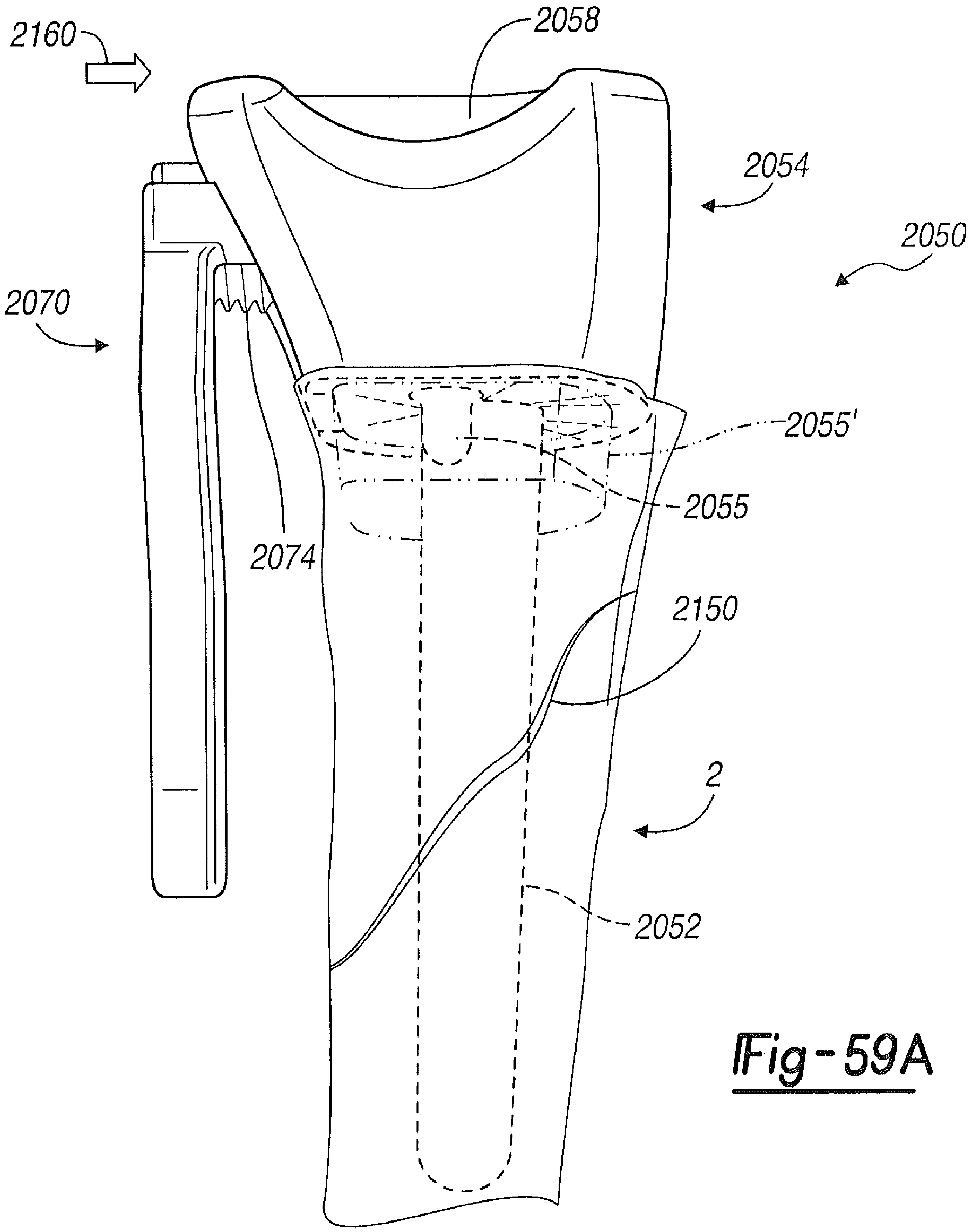
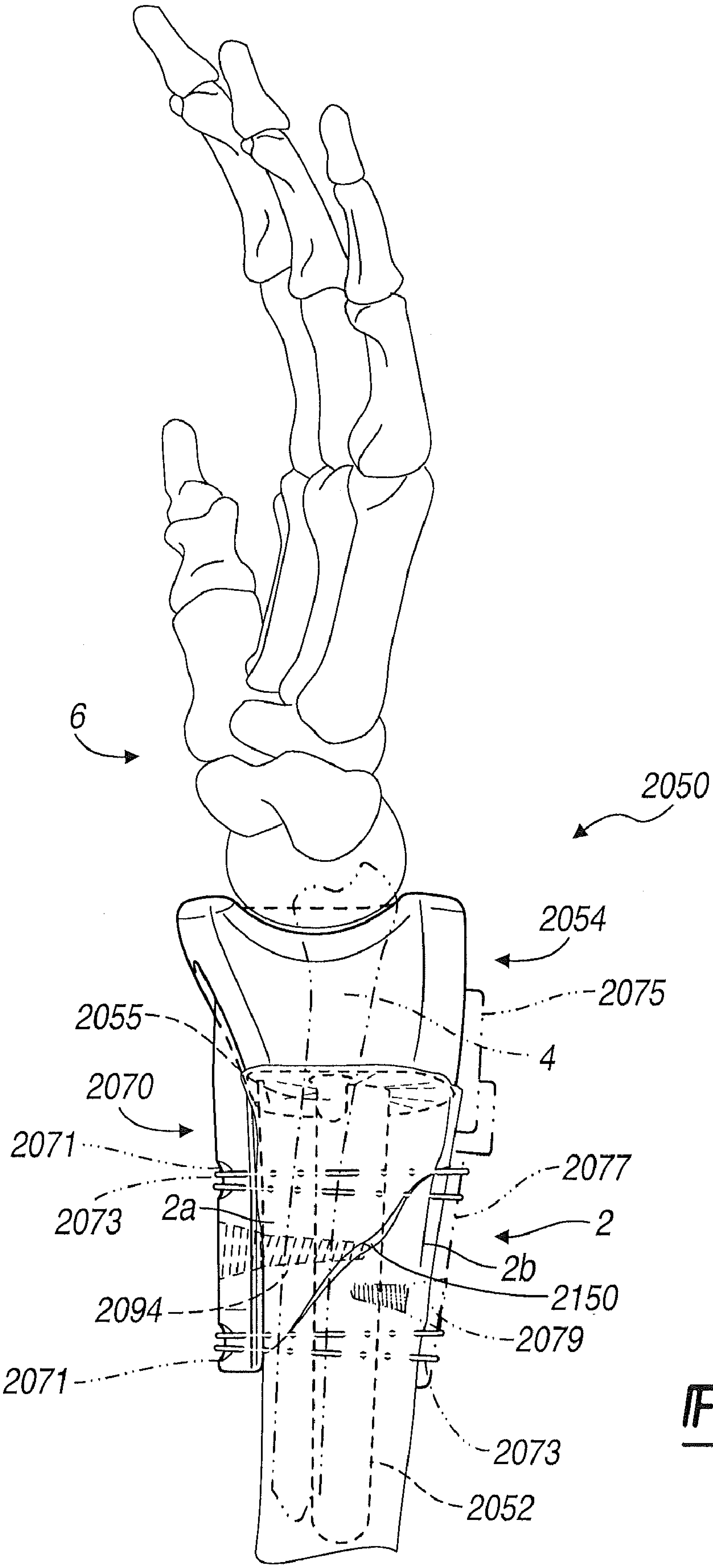
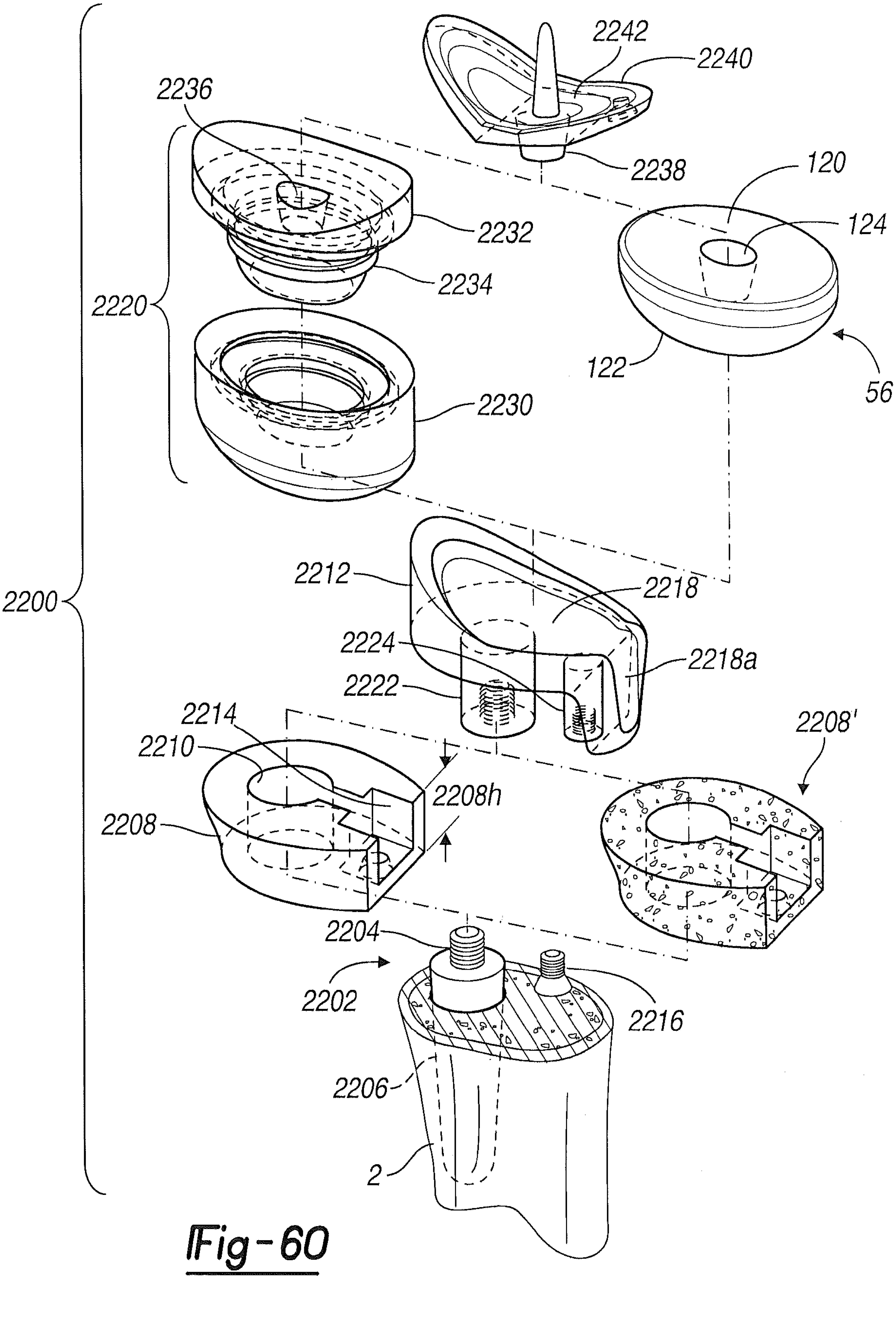


Fig-59A



6
2050
2054
2075
2055
4
2070
2071
2077
2073
2a
2
2b
2150
2094
2079
2071
2073
2052

Fig-59B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2214
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2210
2208h
2208
2204
2202
2216
2206
2

Fig-60

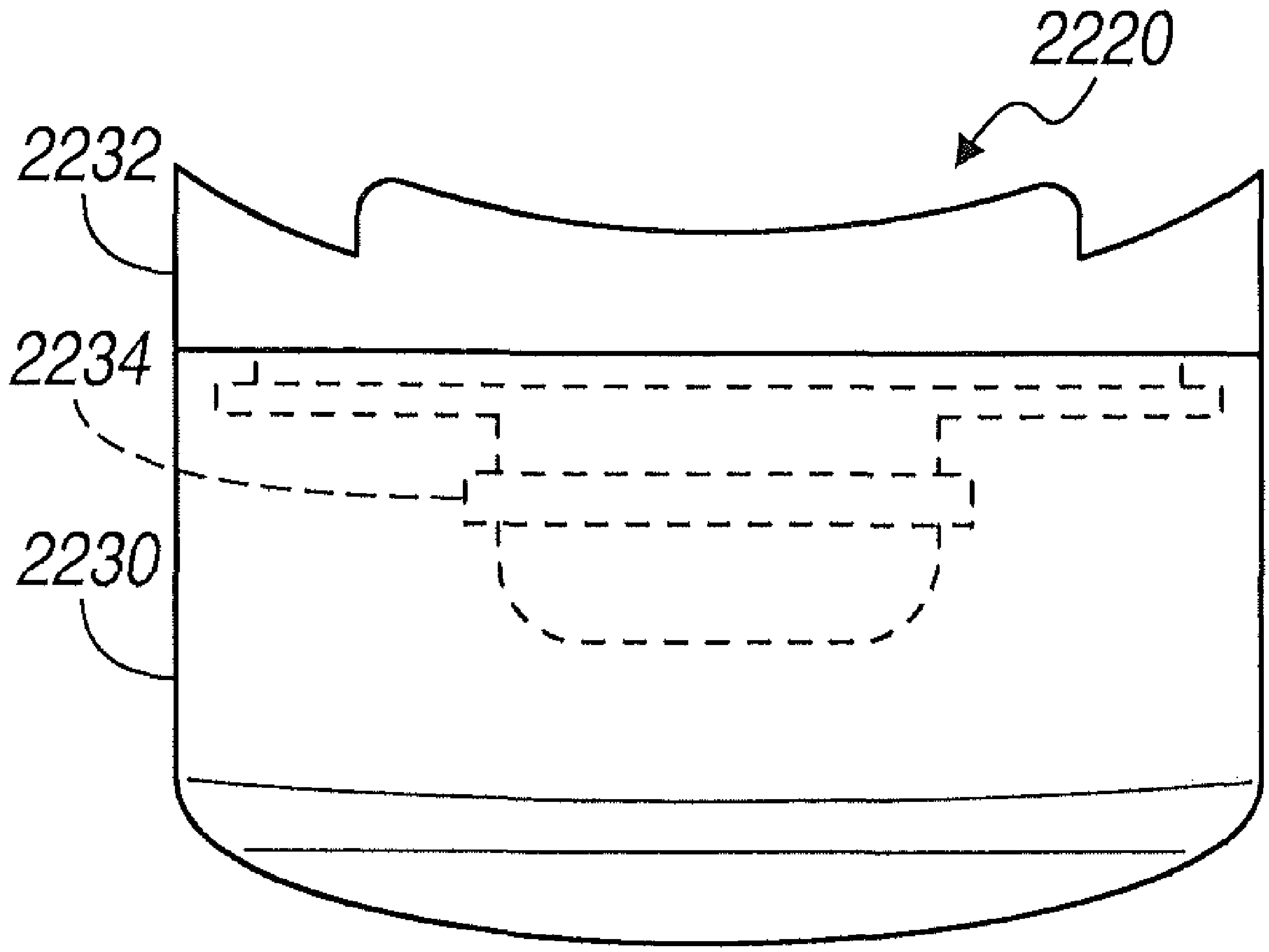
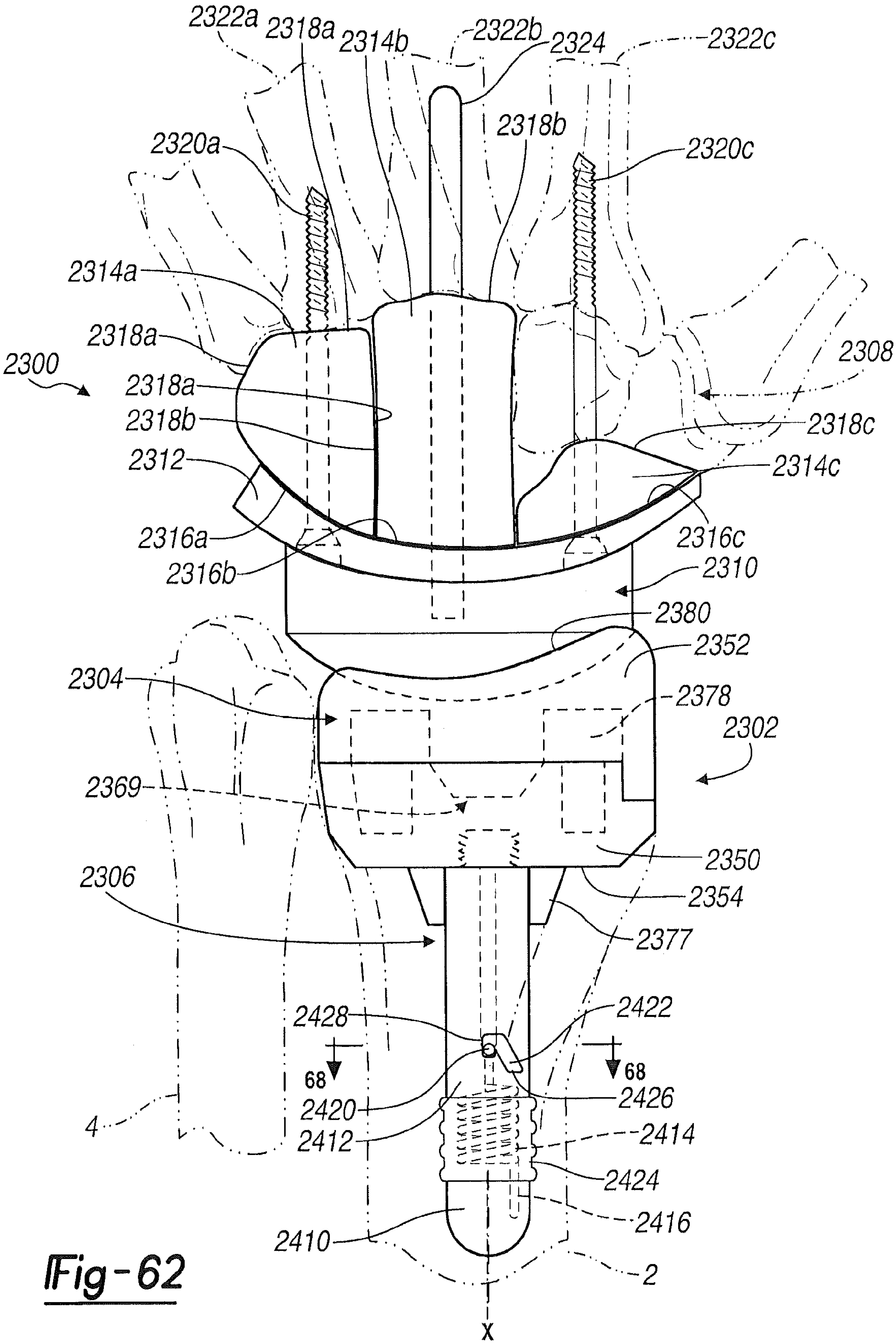


Fig-61



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2322c
2318b
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2318a
2300
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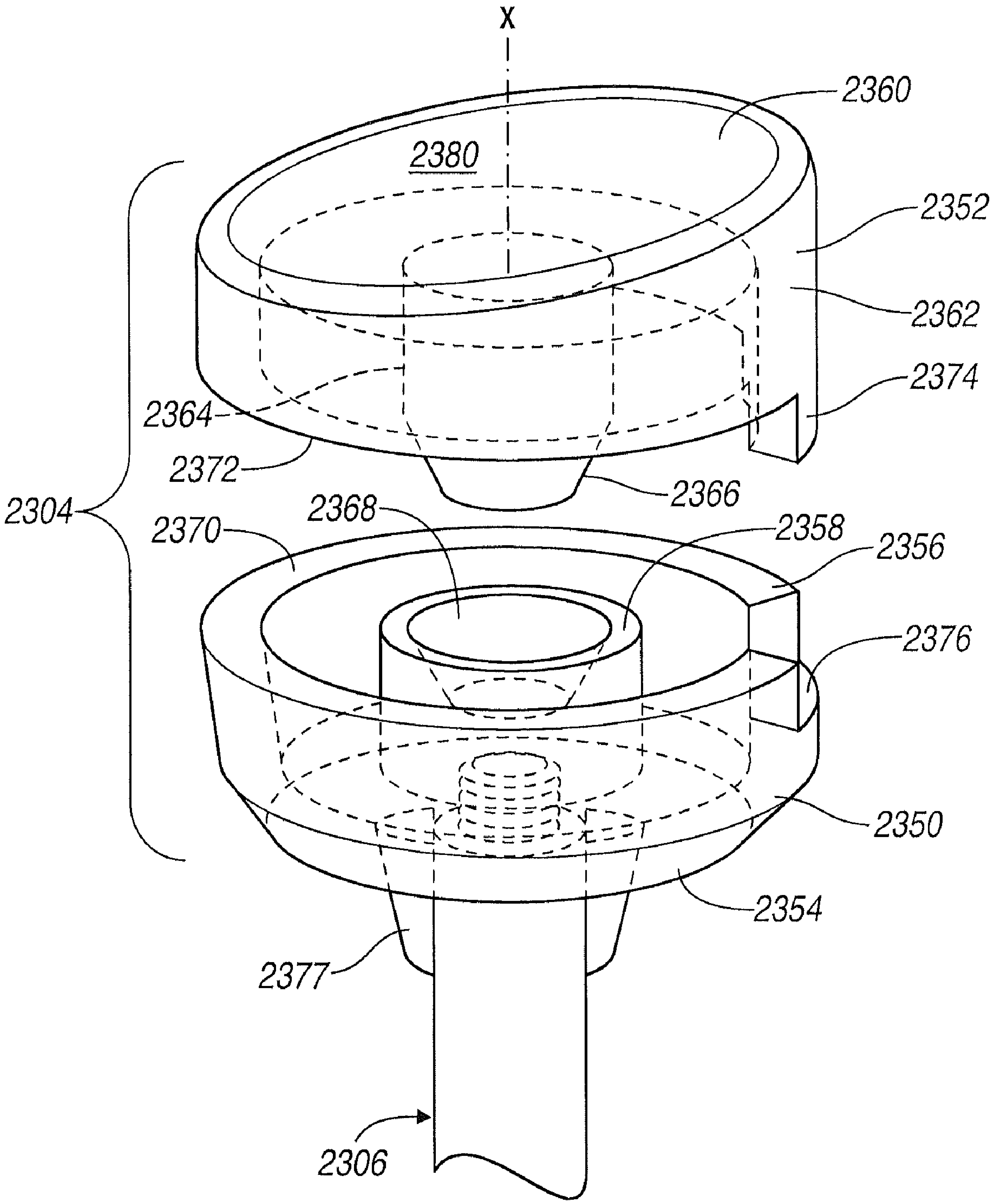
2318b
2308
2318c
2312
2314c
2316a
2316b
2316c
2310
2380
2352
2304
2378
2302
2369
2350
2306
2354
2377
2428
2422
68
68
2420
2426
2412
2414
4
2424
2416
2410
2
X

Fig-62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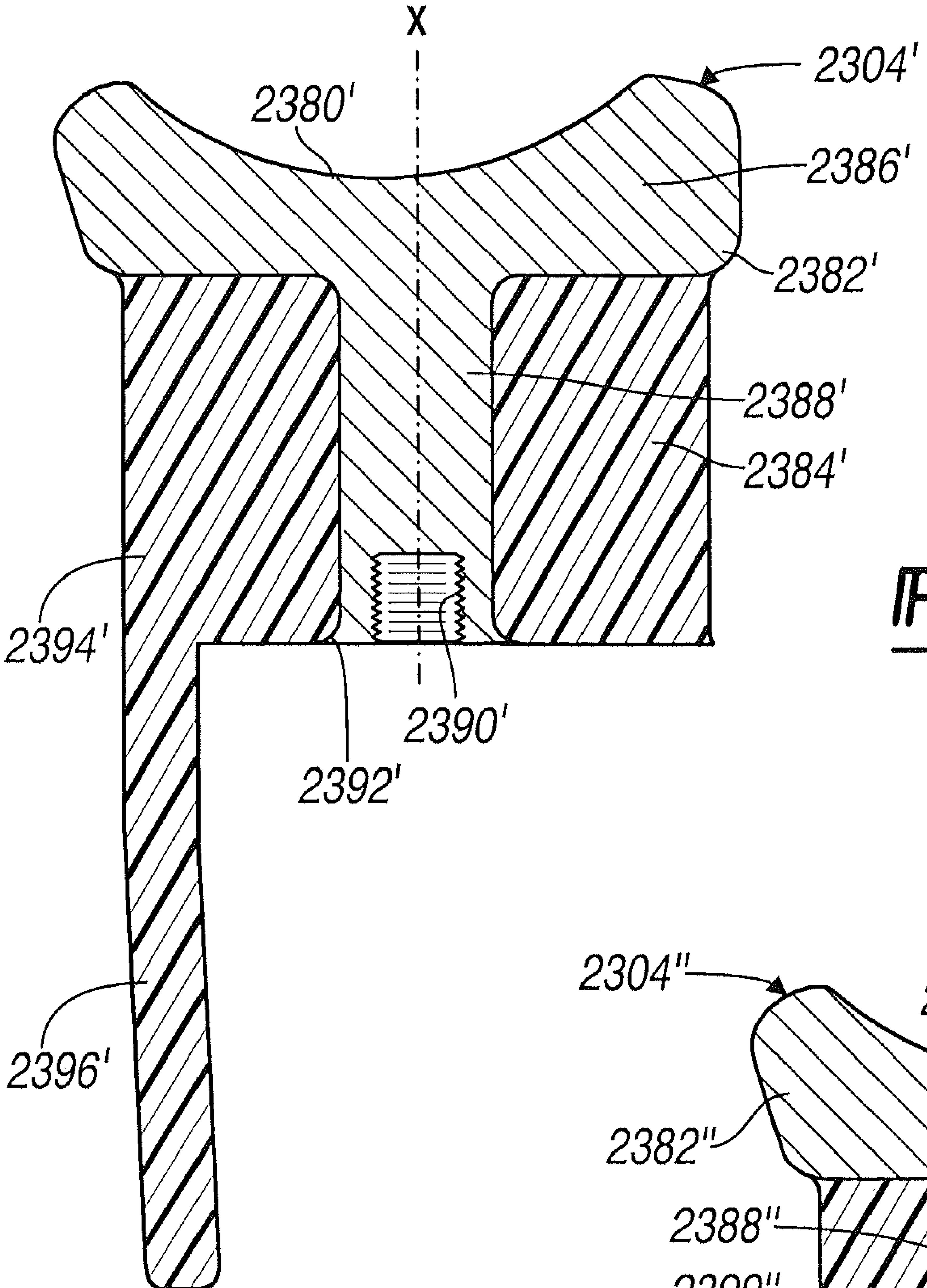
2377
2306

Fig-63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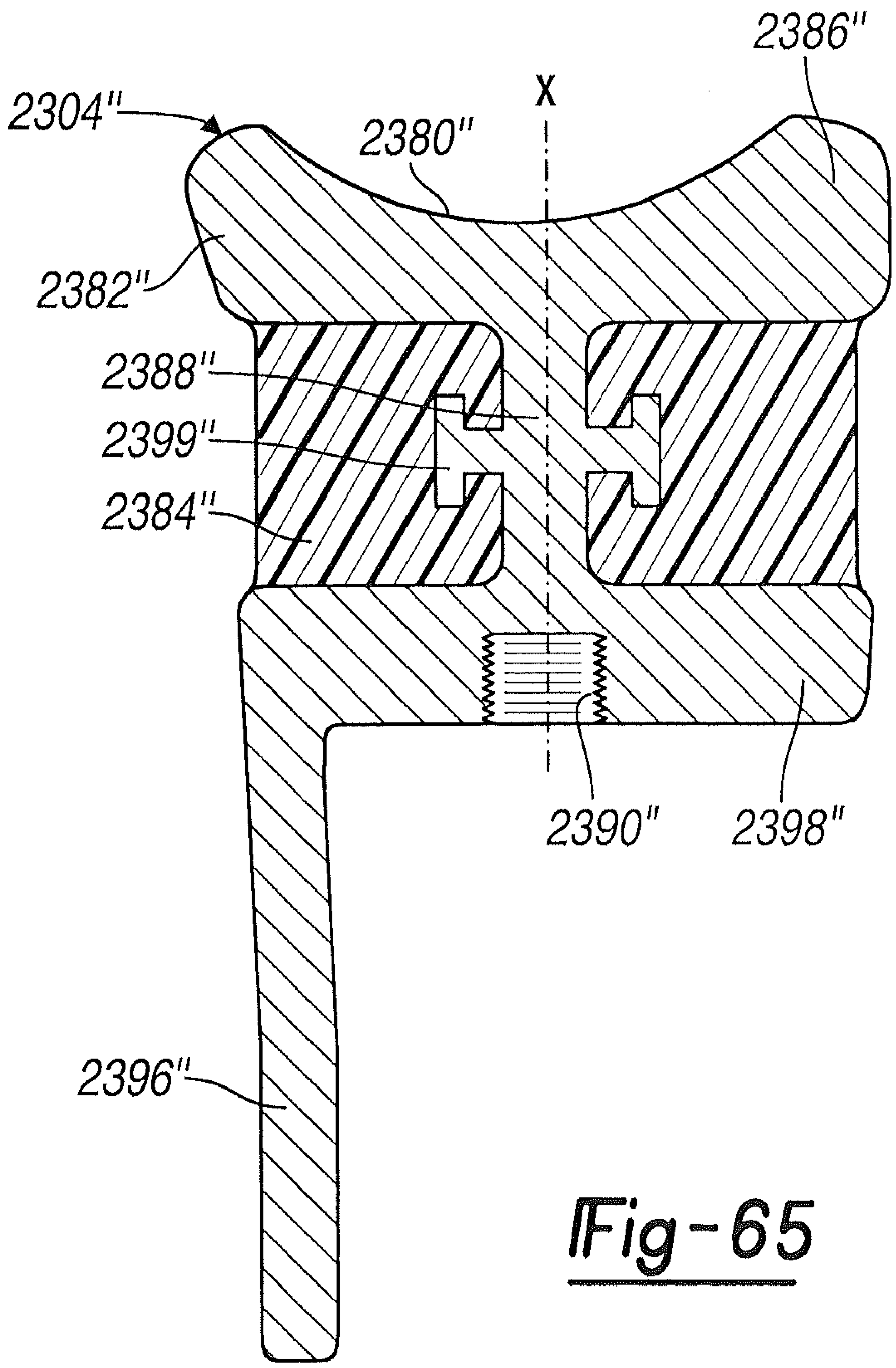
2388'
2384'
2394'
2390'
2392'
2396'

Fig-64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X
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2380''
2382''
2388''
2399''
2384''
2390''
2398''
2396''

Fig-65

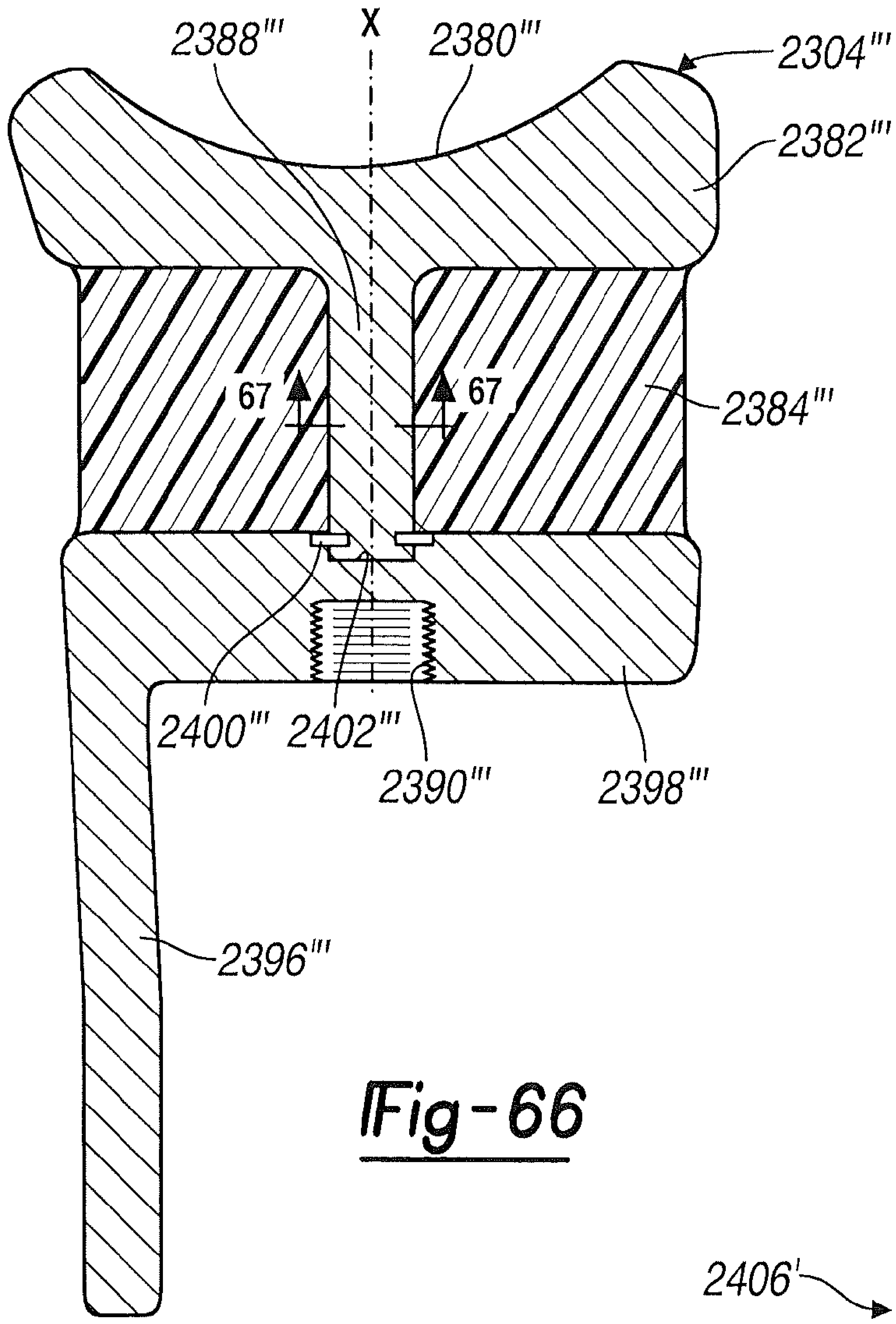

Fig-66

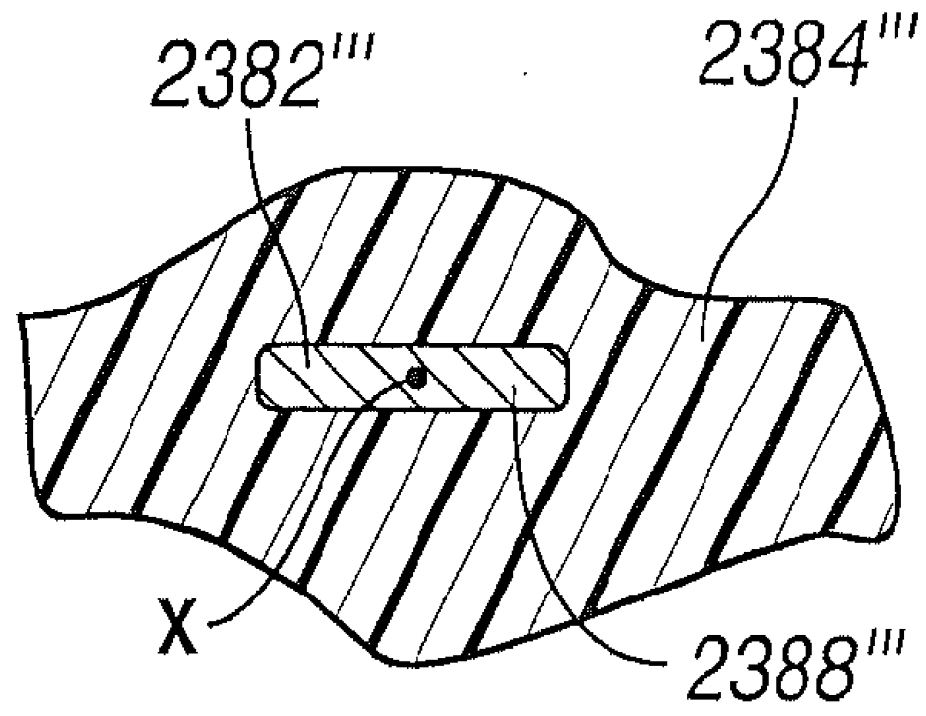

Fig-67

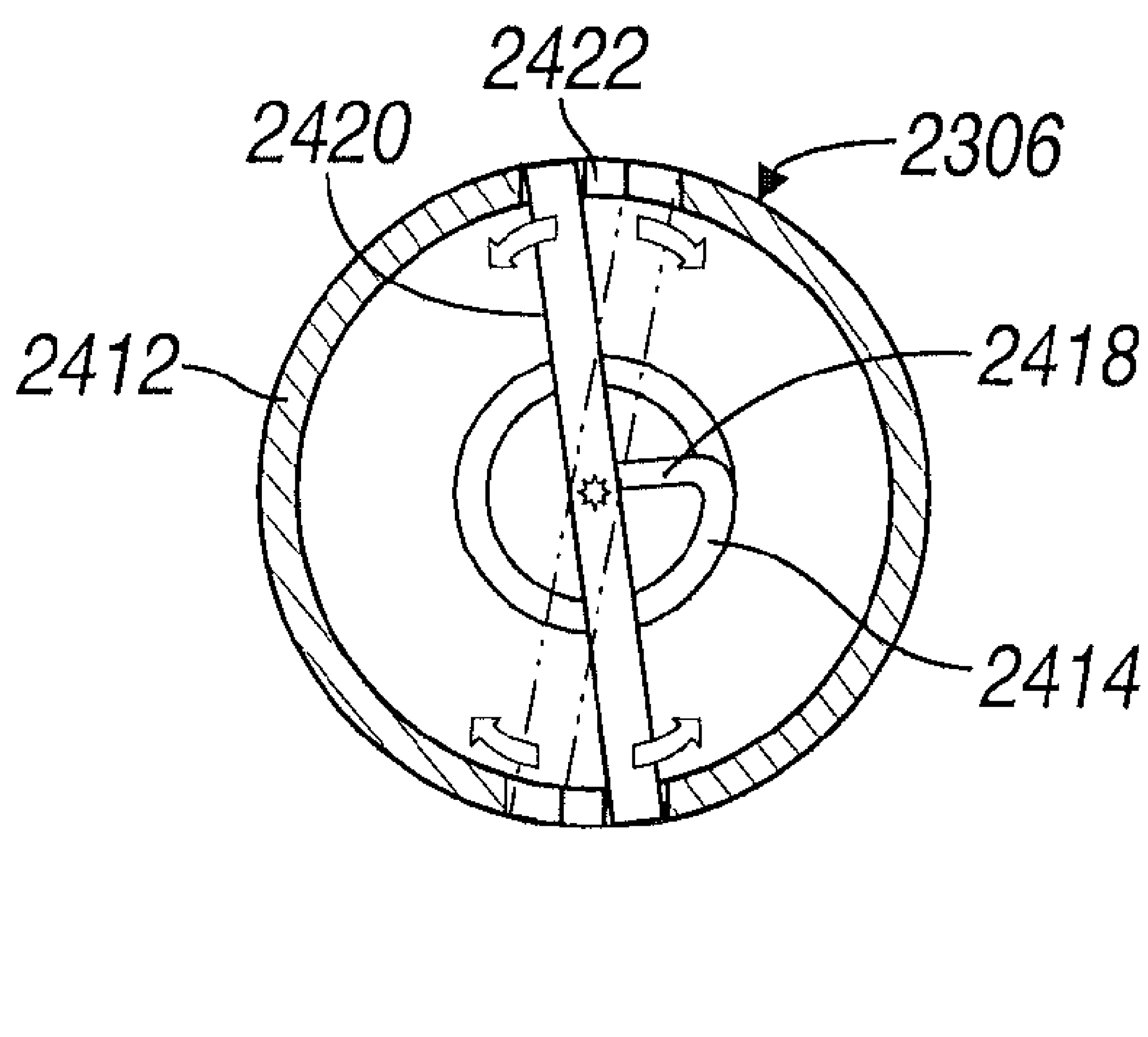

Fig-68

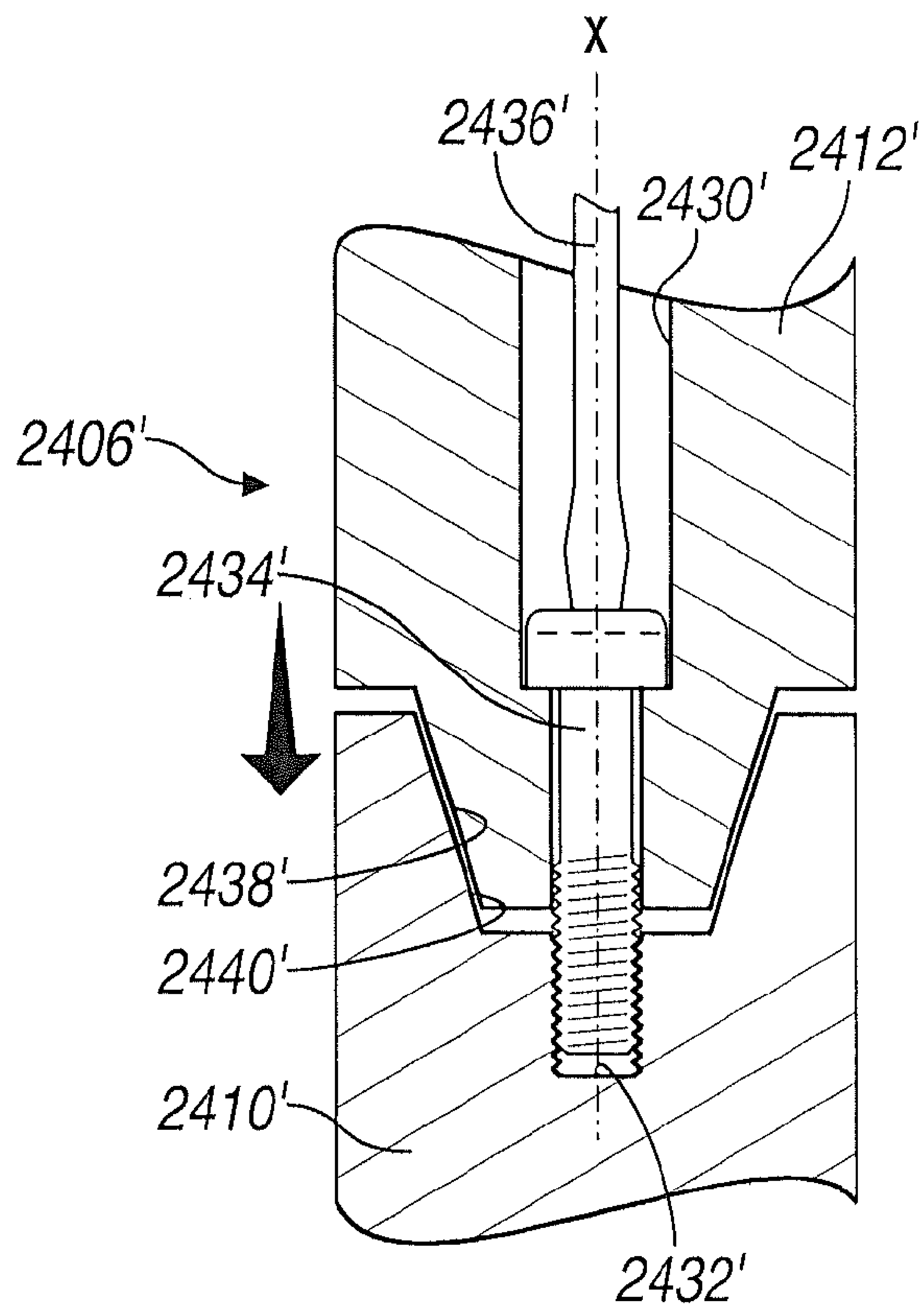

Fig-69

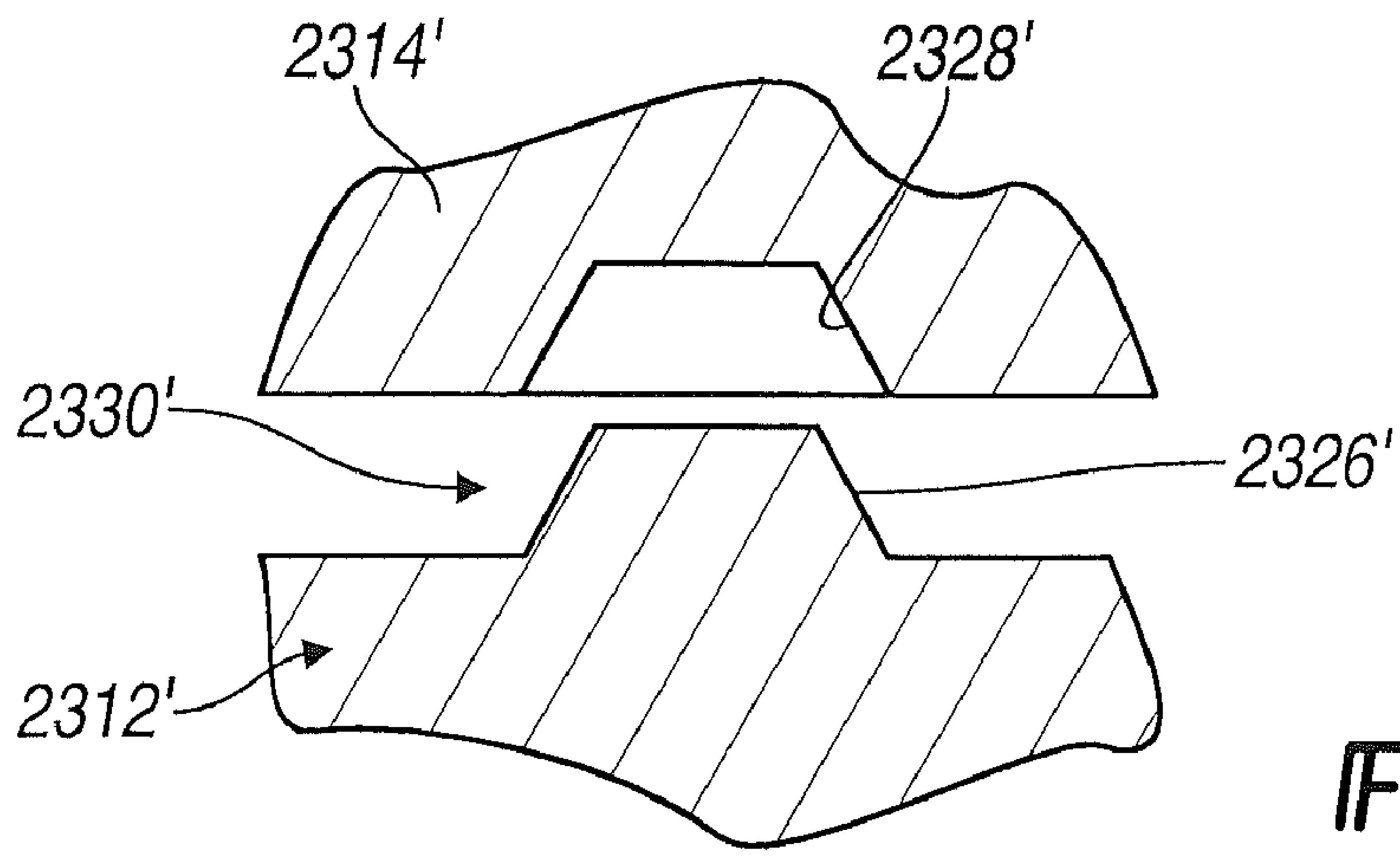

Fig-70

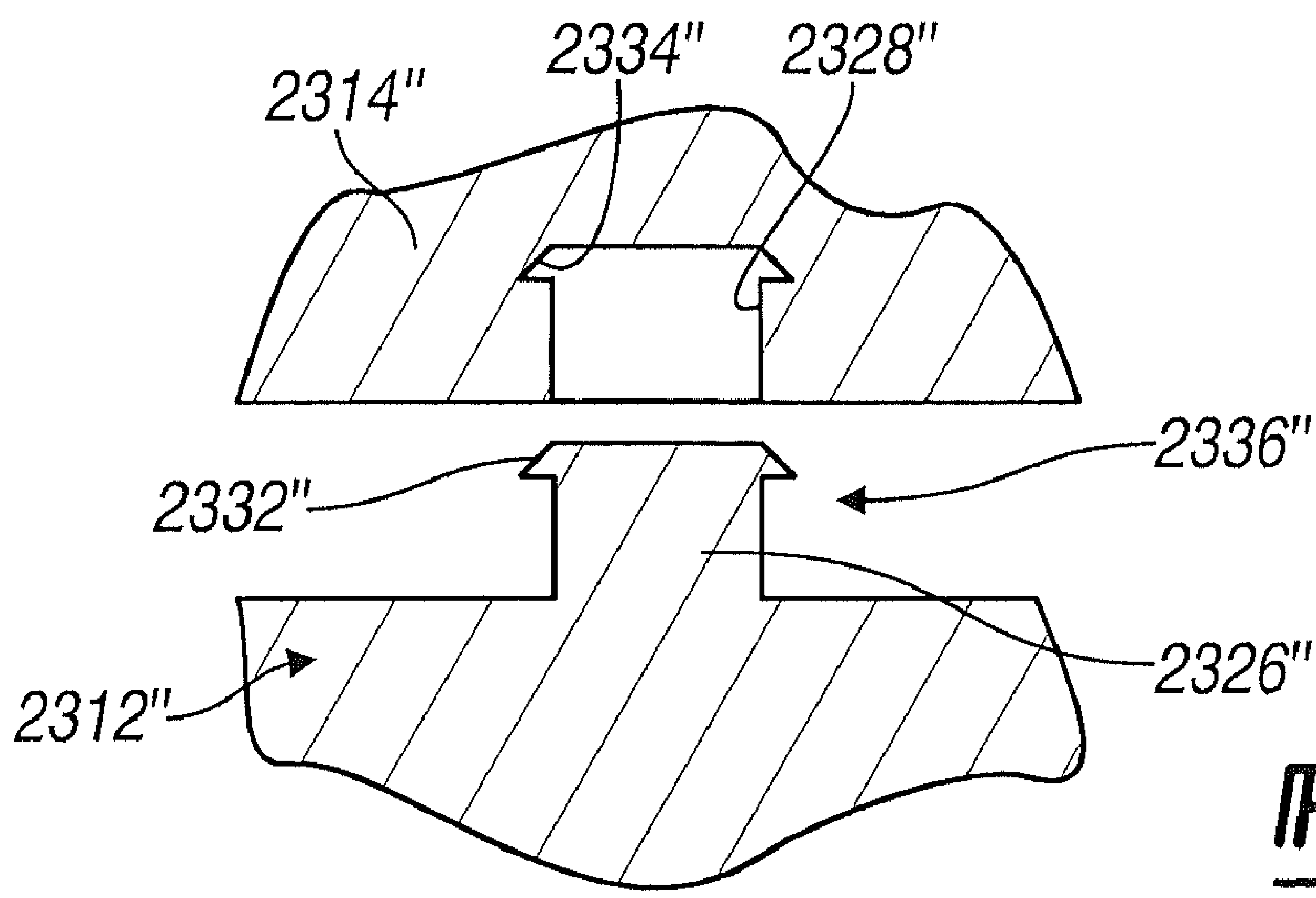

Fig-71

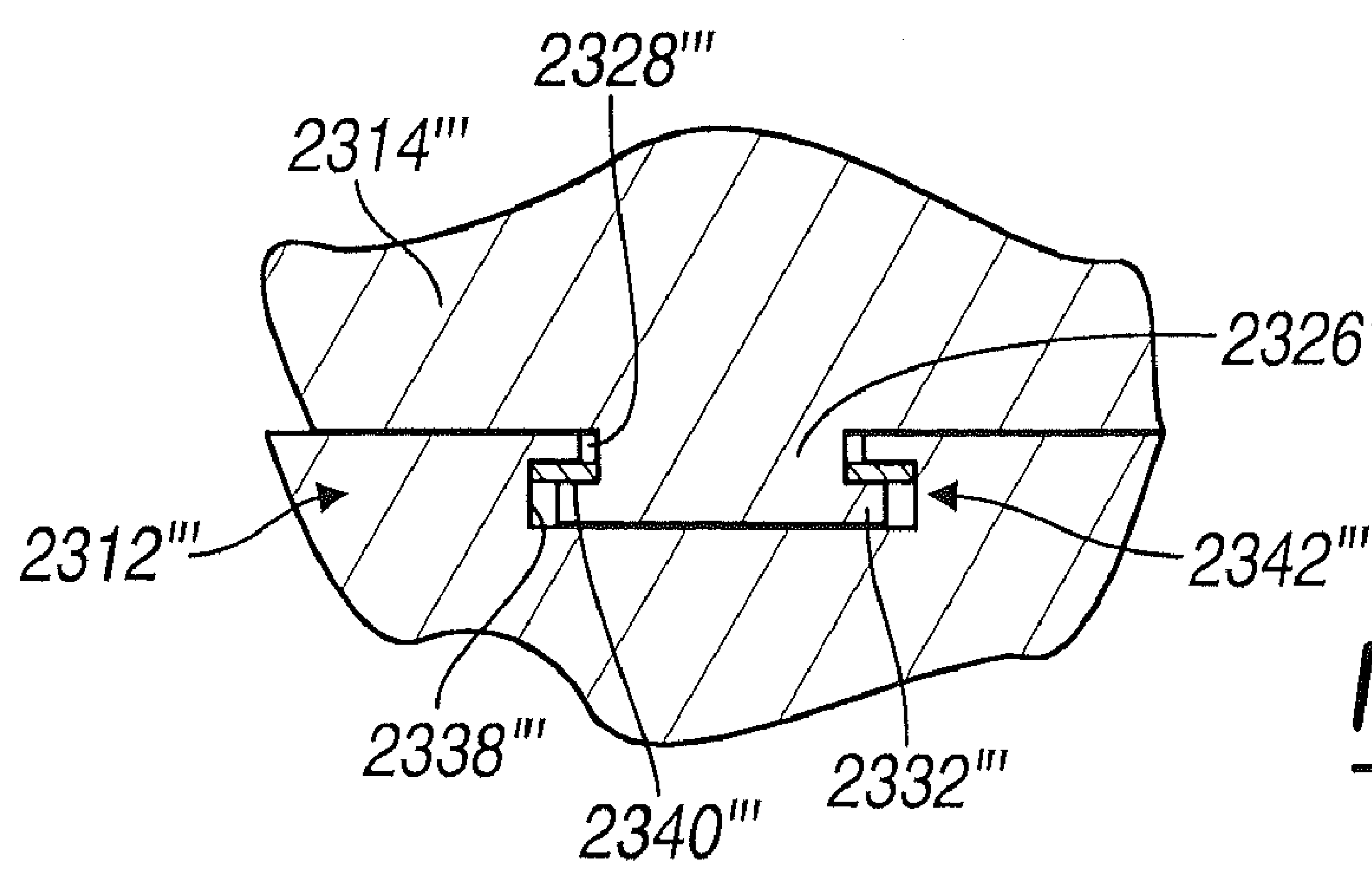

Fig-72

METHOD AND APPARATUS FOR WRIST ARTHROPLASTY

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation-in-part of U.S. patent application Ser. No. 11/867,884, filed on Oct. 5, 2007, which is a continuation-in-part of U.S. patent application Ser. No. 11/517,537, filed on Sep. 7, 2006, which is a continuation-in-part of U.S. patent application Ser. No. 11/260,729, filed on Oct. 27, 2005, which is a continuation-in-part of U.S. patent application Ser. No. 10/862,821, filed on Jun. 7, 2004, which is a continuation-in-part of U.S. patent application Ser. No. 10/279,240, filed on Oct. 24, 2002, now U.S. Pat. No. 6,746,486. The disclosures of each of the above applications are incorporated herein by reference.

FIELD

The present teachings generally relate to prosthetic implants and more particularly to prosthetic wrist implants.

BACKGROUND

With reference to FIG. **1** of the drawings, the dorsal side of the bone structure of a patient's left hand and wrist is illustrated in conjunction with the radius **2** and the ulna **4**. The bone structure includes a carpal bone complex **6** having a scaphoid **8**, a lunate **10**, a triquetrum **12**, a pisiform **14**, a trapezium **16**, a trapezoid **18**, a capitate **20** and a hamate **22**. It will be appreciated that the scaphoid **8** and the lunate **10** bones articulate with the radius **2** during the movement of the wrist.

In a variety of wrist disorders, patients may experience discomfort, pain and difficulty in moving the wrist. Prior surgical treatment of this condition involved fusion to inhibit movement of the scaphoid **8** and the lunate **10** bones relative to the radius to thereby alleviate pain in the patient's wrist. This procedure, however, leaves the patient without motion in their wrist and thereby severely restricts the use of their wrist. Prosthetic wrist implants have been developed to provide a pair of artificial bearing surfaces for the wrist. Several of the prior wrist implants have suffered from drawbacks including limited range of motion and excessive bone resection. Others still provide proper motion only when aligned in an extremely precise manner relative to the carpal bone complex **6**. While various jigs and fixtures may be employed to aid in the locating and forming of a hole in the distal portion of the carpal bone complex **6** for receiving a carpal implant, these devices typically do not completely eliminate the possibility of error in the alignment and forming of the hole.

Accordingly, there remains a need in the art for an improved prosthetic wrist implant that provides improved support and strength for the distal portion of the carpal bone complex **6** and which has a bearing surface whose orientation is changeable after implantation to provide the implanted prosthetic wrist with a range of motion that mimics the range of motion of a natural wrist.

SUMMARY

An implant for a wrist arthroplasty, such as a total or hemi-arthroplasty, is disclosed. Various embodiments include providing a hemi-arthroplasty included for either replacing the distal portions of the radius, ulna or both to articulate with natural portions of the carpal bone complex. Also, a hemi-arthroplasty prosthesis that includes replacing portions of only the carpal bone complex is disclosed. Alternatively, an arthroplasty may occur regarding the radius or ulna bones and the carpal bones to provide a substantially complete wrist arthroplasty. In addition, both the carpal bone complex prosthesis and the radius and ulna prosthesis may include substantially modular portions such that selections may be made during an operative procedure to assist in providing a substantially best fit or customized implant for a selected patient. In addition, various portions of the prosthesis may include parts to replace complete bones of the carpal bone complex or other anatomical portions to assist in providing a substantially natural articulation and range of motion of the wrist after the procedure.

According to various embodiments, a modular prosthesis for placement in a wrist relative to a radius is disclosed. A distal radial assembly may include a stem portion operable to be positioned relative to a portion of the radius and a distal radial segment operable to be interconnected with the stem portion during an operative procedure. The stem portion and the distal radial segment are provided to be interconnected to substantially form a portion of a radial articulation with a carpal complex.

According to various embodiments, a modular prosthesis for placement in a wrist is disclosed. A distal radial assembly including a stem portion operable to be positioned within a portion of a radius and a distal radial segment operable to be interconnected with the stem portion during an operative procedure. The modular prosthesis may also include a carpal implant operable to be interconnected with a portion of the wrist to articulate with the distal radial implant. The stem portion and the distal radial segment are provided to be interconnected to substantially form a portion of a radial articulation with a carpal complex.

According to various embodiments, a kit for performing an arthroplasty relative to the wrist joint including the radius and the carpal complex is disclosed. A stem member operable to be positioned relative to the radius having a stem connection portion may be provided. A distal radial segment may also be included having a segment connecting portion operable to be associated with the stem member. A carpal implant may be provided to be associated with the carpal complex. Also, a bearing member may be disposable between the distal radial segment and the carpal complex implant. At least two of the stem member, the distal radial segment, the carpal complex implant; and the bearing member are associated to perform the arthroplasty.

According to various embodiments a method of performing a wrist arthroplasty relative to a radius and a carpal complex. The method includes forming an incision relative to the wrist and determining an arthroplasty to be performed for the wrist arthroplasty. Also a stem member and a distal radial segment may be selected. The selected stem member and the distal radial segment may be interconnected. Each of the members may be positioned in the anatomy and the stem member may be positioned relative to the radius.

According to various embodiments, a prosthesis to replace a portion of a bone is disclosed. The prosthesis can include a stem member extending between a first end and a second end wherein the second end is operable to extend into the bone and an articulation assembly. The articulation assembly can include a stem connection portion to interconnect with the first end of the stem member and held relative to the bone, an articulation portion operable to extend from the stem connection portion, and a connection portion operable to interconnect the stem connection portion and the articulation portion. The articulation portion can form an articulation assembly with a second member.

According to various embodiments, a prosthesis to replace a portion of a bone is disclosed. The prosthesis can include a first member operable to engage a carpal bone including a carpal bone facing surface having at least two flat surfaces and a second member assembly. The second member assembly can include a first portion formed of a hard material and a second portion formed of a soft material that is softer than the hard material. The first member and the second member can be connected.

According to various embodiments, a prosthesis to replace a portion of a bone is disclosed. The prosthesis can include a first portion operable to be connected to a first bone, the first portion includes a stem member that can extend into the first bone and an articulation member that can extend distally from the first bone, wherein the articulation member can be formed of a metal material. The prosthesis can further include a second portion that can be connected to a second bone, the second portion includes a first member formed of a hard material and a second member formed of a soft material that can be softer than the hard material. The second member can form an articulation with the articulation member.

According to various embodiments, a wrist prosthesis system to replace at least a portion of a bone of a wrist of a patient is disclosed. The system includes a carpal implant to replace at least a portion of a carpal bone of a carpal complex of the patient. The carpal implant includes a base and an augment that replaces at least a portion of the carpal bone. The augment is removably coupled to the base.

According to various embodiments, a wrist prosthesis system to replace at least a portion of a bone of a wrist of a patient is disclosed. The wrist prosthesis system includes a radial implant with a bone replacement member that replaces at least a portion of a radius of the patient. The radial implant also includes a stem that extends into the radius of the patient. The wrist prosthesis system further includes a carpal implant that is operatively coupled to the radial implant. The carpal implant includes a base and an augment that replaces at least a portion of a carpal bone of a carpal complex of the patient. The augment is removably coupled to the base.

Further areas of applicability of the present teachings will become apparent from the detailed description provided hereinafter. It should be understood that the detailed description and various examples, while indicating the various embodiments of the teachings, are intended for purposes of illustration only and are not intended to limit the scope of the teachings or the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

Additional advantages and features of the present invention will become apparent from the subsequent description and the appended claims, taken in conjunction with the accompanying drawings, wherein:

FIG. **1** is a view of the dorsal side of a patient's left hand and wrist illustrating the bone structure of the hand and wrist in conjunction with the radius and the ulna;

FIG. **2** is a view of the dorsal side of a patient's left hand and wrist illustrating the implantation of a prosthetic wrist implant constructed in accordance with the teachings of the present invention;

FIG. **3** is an exploded view of a prosthetic wrist constructed in accordance with the teachings of the present invention;

FIG. **4** is a perspective view of a portion of the prosthetic wrist of FIG. **2** illustrating the carpal implant in greater detail;

FIG. **5** is a side view of a portion of the prosthetic wrist of FIG. **2** illustrating the wrist bearing component in the coronal plane;

FIG. **6** is a side view of a portion of the prosthetic wrist of FIG. **2** illustrating the wrist bearing component in the sagittal plane;

FIG. **7** is an exploded perspective view of a prosthetic wrist similar to that of FIG. **2** but additionally including an alignment mechanism for radially fixing the wrist bearing component relative to the carpal implant;

FIG. **8** is an exploded view in partial section of a prosthetic wrist constructed in accordance with the teachings of a second embodiment of the present invention;

FIG. **9** is a view of a kit that utilizes the prosthetic wrist of FIG. **8**;

FIG. **10** is a side elevation view of a carpal implant constructed in accordance with the teachings of a third embodiment of the present invention;

FIG. **11** is a side elevation view of a carpal implant constructed in accordance with the teachings of a fourth embodiment of the present invention;

FIG. **12** is a side elevation view of a carpal implant constructed in accordance with the teachings of a fifth embodiment of the present invention;

FIG. **13** is an exploded front elevation view of a portion of a prosthetic wrist constructed in accordance with the teachings of a sixth embodiment of the present invention;

FIG. **14** is a side elevation view of a portion of the prosthetic wrist of FIG. **13**;

FIG. **15** is an exploded side elevation view of a prosthetic wrist constructed in accordance with the teachings of a seventh embodiment of the present invention;

FIG. **16** is an exploded side elevation view of a prosthetic wrist constructed in accordance with the teachings of an eighth embodiment of the present invention;

FIG. **17** is an exploded perspective view of a prosthetic wrist constructed in accordance with the teachings of a ninth embodiment of the present invention;

FIG. **18** is an exploded side elevation view of the prosthetic wrist of FIG. **17**;

FIG. **19** is an exploded perspective view of a prosthetic wrist constructed in accordance with the teachings of a tenth embodiment of the present invention;

FIG. **20** is an exploded side elevation view of the prosthetic wrist of FIG. **19**;

FIG. **21** is an exploded side elevation view of a prosthetic wrist constructed in accordance with the teachings of an eleventh embodiment of the present invention;

FIG. **22** is an exploded side perspective view of the prosthetic wrist of FIG. **21**;

FIG. **21**A is an exploded side elevation view of a prosthetic wrist constructed in accordance with the teachings of various embodiments of the present invention;

FIG. **22**A is an exploded perspective view of the prosthetic wrist of FIG. **21**A;

FIG. **23** is an exploded side elevation view of a prosthetic wrist constructed in accordance with the teachings of a twelfth embodiment of the present invention;

FIG. **24** is an exploded side elevation view of a prosthetic wrist constructed in accordance with the teachings of a thirteenth embodiment of the present invention;

FIG. **25** is a sectional view taken along the line **25-25** of FIG. **24**;

FIG. **26** is an exploded side elevation view of a prosthetic wrist constructed in accordance with the teachings of a fourteenth embodiment of the present invention; and

FIG. **27** is a sectional view taken along the line **27-27** of FIG. **26**.

FIG. **28** is a proximal-to-distal view of the carpal complex;

FIG. **29**A is a plan view of a carpal implant according to various embodiments;

FIG. **29**B is a plan view of a carpal implant according to various embodiments;

FIG. **30** is a plan view of a carpal implant according to various embodiments;

FIG. **31** is an environmental view of the carpal implant according to various embodiments of FIG. **30** implanted;

FIG. **32** is a distal radial implant according to various embodiments;

FIG. **33** is a stem portion of a distal radial implant according to various embodiments;

FIG. **34**A is a plan view of a distal radial segment of a modular distal radial implant according to various embodiments;

FIG. **34**B is a perspective view of the distal radial segment of FIG. **34**A;

FIG. **35**A is a plan view of distal radial segment for a distal radial implant according to various embodiments;

FIG. **35**B is a perspective view of the distal radial segment of FIG. **35**A;

FIG. **36**A is a plan view of a distal radial segment implant according to various embodiments;

FIG. **36**B is a perspective view of the distal radial implant of FIG. **36**A;

FIG. **37** is an environmental view of the distal radial implant of FIG. **36**A in an implanted position;

FIG. **38**A is a distal radial segment of the distal radial implant according to various embodiments;

FIG. **38**B is a perspective view of the distal radial segment of FIG. **38**A;

FIG. **39**A is a plan view of a bearing portion for a distal radial segment according to various embodiments;

FIG. **39**B is a perspective view of the bearing portion of FIG. **39**A according to various embodiments;

FIG. **40**A is a plan view of a bearing portion for a distal radial implant according to various embodiments;

FIG. **40**B is a perspective view of the bearing portion of FIG. **40**A;

FIG. **41** is a perspective view of a distal radial implant according to various embodiments;

FIG. **42** is a perspective view of a distal radial implant according to various embodiments;

FIG. **43** is an environmental view of the distal radial implant of FIG. **42** according to various embodiments in an implanted position;

FIG. **44** is a kit view of various embodiments of the present invention.

FIG. **45** is an environmental view of a hemi-arthroplasty replacing a portion of a carpal complex according to various embodiments;

FIG. **46** is a plan view of a distal radial replacement according to various embodiments;

FIG. **47** is a top plan view of the device illustrated in FIG. **46**;

FIG. **48** is a end elevation view of a distal radial replacement according to various embodiments;

FIG. **49** is a side elevation view of a distal radial replacement according to various embodiments;

FIG. **50** is a perspective detail environmental view of a distal radial implant according to various embodiments;

FIG. **51** is a plan view of a kit including various components for a bone replacement system;

FIG. **52** is an environmental view of preparing an anatomical portion for a bone replacement;

FIG. **53** is an environmental view of the portion of an anatomy resected for a bone replacement implant according to various embodiments;

FIG. **54** is an environmental view illustrating a positioning of a portion of an implant according to various embodiments;

FIG. **55** is an environmental view of an implant positioned relative to a portion of the anatomy according to various embodiments;

FIG. **56** is an exploded perspective view of a distal radial prosthesis according to various embodiments;

FIG. **57** is an environmental perspective view of the distal radial prosthesis of FIG. **56**;

FIG. **58**A is an exploded perspective view of a distal radial prosthesis according to various embodiments;

FIG. **58**B is an assembled perspective view of a distal radial prosthesis according to various embodiments;

FIG. **59**A is an environmental perspective view of a distal radial prosthesis according to various embodiments;

FIG. **59**B is an environmental perspective view of a distal radial prosthesis according to various embodiments substantially implanted relative to a radius;

FIG. **60** is an exploded perspective view of a wrist prosthesis, according to various embodiments;

FIG. **61** is a plan view of a bearing component, according to various embodiments;

FIG. **62** is a view of the dorsal side of a patient's left hand and wrist illustrating a wrist prosthesis system, according to various embodiments;

FIG. **63** is an exploded perspective view of a bone replacement member of the wrist prosthesis system of FIG. **62**;

FIG. **64** is a section view of another embodiment of the bone replacement member of the wrist prosthesis system of FIG. **62**;

FIG. **65** is a section view of another embodiment of the bone replacement member of the wrist prosthesis system of FIG. **62**;

FIG. **66** is a section view of another embodiment of the bone replacement member of the wrist prosthesis system of FIG. **62**;

FIG. **67** is a section view of the bone replacement member taken along the line **67**-**67** of FIG. **66**;

FIG. **68** is a section view of a stem of the wrist prosthesis system taken along the line **68**-**68** of FIG. **62**;

FIG. **69** is a section view of another embodiment of the stem of the wrist prosthesis system;

FIG. **70** is an exploded section view of a coupling for the wrist prosthesis system of FIG. **62**;

FIG. **71** is an exploded section view of another embodiment of a coupling for the wrist prosthesis system of FIG. **62**; and

FIG. **72** is an assembled section view of another embodiment of a coupling for the wrist prosthesis system of FIG. **62**.

DETAILED DESCRIPTION OF VARIOUS EMBODIMENTS

The following description of various embodiments is merely exemplary in nature and is not intended to limit the teachings, application, or uses of various embodiments.

With reference to FIGS. **2** and **3** of the drawings, a prosthetic wrist constructed in accordance with the teachings of the present invention is generally indicated by reference numeral **50**. The prosthetic wrist **50** is illustrated in a post operative condition as implanted to a distal portion **2***a* of the radius **2** and a proximal portion **6***a* of the carpal bone complex **6**. As those skilled in the art will appreciate, the distal portion **2***a* of the radius **2** and the proximal portion **6***a* of the carpal bone complex **6** are formed when the surgeon resects a portion of the radius **2** and the carpal bone complex **6** from the patient prior to implantation of the prosthetic wrist **50**.

The prosthetic wrist is illustrated to include a radial implant **52**, a carpal implant **54**, a wrist bearing component **56** and a plurality of bone screws **58**. The radial implant **52** includes a radial stem **60**, which is configured to be implanted into a distal portion **2***a* of the radius **2**, and a bearing guide **62**, which is fixed to the distal end of the radial stem **60**. The bearing guide **62** includes a bearing or concave guide surface **64** that is configured to engage in a mating manner the wrist bearing component **56**. In the preferred embodiment, the radial implant **52** is unitarily formed from a titanium material, such as Ti-6Al-4V (F136), although those skilled in the art will understand that other materials having sufficient strength and biocompatibility may also be employed. Those skilled in the art will also understand that the radial implant **52** may be configured in a modular manner, wherein the radial stem **60** and the bearing guide **62** are discrete elements that are coupled together prior to or during the process of implantation. It will also be understood that the bearing guide **62** may be integrally formed or molded onto the radial implant **52** and formed of a selected material. For example, the bearing guide **62** may be formed of a polyethylene material or other polymer to be formed with the radial stem **60**. Therefore the radial implant **52** may include a proximal radial stem on a distal radial portion over which the bearing guide portion **62** is formed. Nevertheless, as discussed above, the bearing guide portion **62** may be formed of any appropriate material such as a ceramic, or a metal including titanium and cobalt chromium molybdenum alloy.

With additional reference to FIGS. **3** and **4**, the carpal implant **54** is illustrated to include a body **70**, a ulnar flange **72** and a radial flange **74**. The carpal implant **54** is unitarily formed from a titanium material, such as Ti-6Al-4V (F136), although those skilled in the art will understand that other materials having sufficient strength and biocompatibility may also be employed.

The body **70** includes a stem **80**, a proximal stem **82** and an interconnecting flange **84**. The stem **80**, which is formed along a stem axis **86** and extends from the distal side of the body **70**, is configured to be inserted into a hole formed in the capitate **20** (FIG. **2**). The proximal stem **82** extends in a direction opposite the stem **80** and is sized to engage the wrist bearing component **56**. In the particular embodiment illustrated, the proximal stem **82** is formed as a tapered cylinder having an axis **88** that is offset ulnarly from the stem axis **86**. Those skilled in the art will appreciate, however, that the axis **88** of the proximal stem **82** may be coincident with the stem axis **86**. The taper of the proximal stem **82** is configured to the profile of a conventional Morse taper for attachment to the wrist bearing component **56**. A fillet radius R is employed to reduce the concentration of stress at the points at which the stem **80** and the proximal stem **82** are joined to the remainder of the body **70**.

The interconnecting flange **84** couples the stem **80** to the ulnar flange **72**. The interconnecting flange **84** includes an interconnecting bone abutment surface **90** that is skewed to the stem axis **86** by an angle that is less than 90 degrees in magnitude and which is preferably about 80 degrees to permit the interconnecting flange **84** to conform to the proximal end of the distal portion **6***a* of the carpal bone complex **6**.

The ulnar flange **72** is coupled to a side of the interconnecting flange **84** proximate the stem **80** and has a lateral bone abutment surface **96** that is configured to abut an ulnar side of the hamate **22** and which projects upwardly from the body **70** in a manner that is skewed to both the stem axis **86** and the interconnecting bone abutment surface **90** by an angle of less than 90 degrees. A securing aperture **98***a*, which is formed in the distal end of the ulnar flange **72** along an axis that is generally perpendicular to the lateral bone abutment surface **96**, is illustrated to include a first portion **100** and a second portion **102**. Although it will be understood that a perpendicular aperture is not required. The first portion **100** of the securing aperture **98***a* has a spherical shape that is configured to matingly engage the frusto-conical surface of the head **58***a* of a bone screw **58**. (FIG. **3**). The second portion **102** of the securing aperture **98***a* has a generally cylindrical shape that is sized to receive the body **58***b* of the bone screw **58**.

In the particular embodiment illustrated, the ulnar bone abutment surface **96** is arranged at an angle of about 50 degrees relative to the stem axis **86**. The distal end of the ulnar flange **72** terminates at an arcuate edge **104** that is defined by a radius that is centered at the centerpoint of the securing aperture **98***a*. As those skilled in the art will readily appreciate, however, the center of the radius need not be centered at the centerpoint of the securing aperture **98***a*.

The radial flange **74** is coupled to the body **70**, and more specifically to the interconnecting flange **84**, on a side opposite the ulnar flange **72** and includes a medial bone abutment surface **110** that is configured to abut a radial side of the distal portion **6***a* of the carpal bone complex **6** and which projects upwardly from the body **70** in a manner that is skewed to the stem axis **86** by an angle of less than 90 degrees. In the particular embodiment illustrated, the radial bone abutment surface **110** is skewed to the stem axis **86** by an angle of about 80 degrees. Like the ulnar flange **72**, the radial flange **74** includes a securing aperture **98***b* and terminates at its distal end at an arcuate edge **112** that is defined by a radius that is centered at the centerpoint of the securing aperture **98***b*. The securing aperture **98***b* is substantially identical to the securing aperture **98***a* but is formed about an axis that is generally perpendicular to the radial bone abutment surface **110**.

In view of the above discussion, those skilled in the art will appreciate that one general concept of the present invention is the provision of a carpal implant having radial and ulnar flanges that are configured to abut portions of the carpal bone complex (whether resected or not) in a way that supports the bones of the radial and ulnar sides of the carpal bone complex. Accordingly, those skilled in the art will appreciate that the carpal implant of the present invention may be formed in any generally concave manner (i.e., wherein at least a portion of each of the radial and ulnar flanges is skewed to the axis of the body) that is configured to abut the radial and ulnar sides of the carpal bone complex (whether resected or not). Other examples of the "concave" formation of the carpal implant of the present invention are illustrated in FIGS. **10** through **12** and **15** through **27** and will be described in detail below.

With renewed reference to FIGS. **2** and **3** and additional reference to FIGS. **5** and **6**, the wrist bearing component **56** has the general shape of an ellipsoidal segment and includes a generally flat abutting edge **120** and a wrist bearing surface **122**. As those skilled in the art will appreciate, the wrist bearing surface **122** does not extend to a point where it intersects the abutting edge **120** as this would cause the wrist bearing component **56** to be too large in size. Accordingly, the flat sides at which the wrist bearing surface **122** terminates permit the wrist bearing surface **122** to be shaped in a desired manner while maintaining proper sizing of the wrist bearing component **56**. A securing feature **124** is formed into or otherwise coupled to the abutting edge **120** to permit the wrist bearing component **56** to be secured to the proximal end of the carpal implant **54**. In the particular example provided, the securing feature **124** is a blind tapered hole that is configured to matingly engage the proximal stem **82**. Those skilled in the art will readily understand, however, that any appropriate coupling means may be employed to couple the wrist bearing component **56** to the carpal implant **54** and as such, the scope of the present invention will not be so limited as to require the coupling of the wrist bearing component **56** and the carpal implant **54** through the engagement of a tapered stem with a tapered hole. As those skilled in the art will appreciate, the modular nature of the wrist bearing component **56** permits the surgeon to select from a variety of wrist bearing components **56** that are differently sized and/or shaped to permit the surgeon to tailor the prosthetic wrist **50** to the individual needs of the patient. Those skilled in the art will also appreciate that the surgeon's selection of a particular wrist bearing component **56** may necessitate the use of a particular radial implant **52** that has a correspondingly different size and/or configuration.

The wrist bearing component **56** is preferably formed from a cobalt chromium alloy, such as CoCrMo, which provides fatigue and corrosion resistance, as well as a relatively high degree of strength. Those skilled in the art will understand that other appropriate materials, including metals and/or plastics, may alternatively be employed to form the wrist bearing component **56** or a portion thereof which includes the wrist bearing surface **122**.

With particular reference to FIGS. **5** and **6**, the wrist bearing surface **122** is illustrated as being defined by a first radius **130** in the coronal plane and a second radius **132** in the sagittal plane. Preferably, the first and second radii **130** and **132** are different and more preferably, the first radius **130** is larger than the second radius **132**. Configuration of the wrist bearing component **56** in this manner permits the prosthetic wrist **50** to move in a manner that more closely approximates the motion of a natural wrist.

In situations where the wrist bearing surface **122** is contoured in a manner that is not defined by a single spherical radius, the orientation of the wrist bearing component **56** relative to the radial implant **52** is critical. Accordingly, the prosthetic wrist **50** preferably also includes an alignment mechanism **150** in such situations for radially fixing the wrist bearing component **56** relative to the carpal implant **54** as is illustrated in FIG. **7**. Preferably, the alignment mechanism **150** permits the surgeon implanting the prosthetic wrist **50** to orient the wrist bearing surface **122** to a predetermined installation orientation that is dependent upon the orientation between the implanted carpal implant **54** and the implanted radial implant **52**. For example, if the radial implant **52** were to be fixed to the distal portion **2***a* of the radius **2** in a manner that was rotated slightly from that which was considered "nominal", the surgeon may be able to compensate for the slight radial offset by rotating the wrist bearing component **56** relative to the carpal implant **54** in an equivalent manner.

The alignment mechanism **150** may permit the wrist bearing component **56** to be rotated in an infinite number of positions relative to the carpal implant **54**, as would the connection of the wrist bearing component **56** to the carpal implant **54** through the Morse taper connection of the proximal stem **82** and the blind tapered hole of the securing feature **124**, or through adhesives, or recessed screws that extend through the wrist bearing component **56** and which engage the body **70** of the carpal implant **54** (not illustrated).

In the particular example provided, the alignment mechanism **150** permits the wrist bearing component **56** to be rotated into one of a plurality of predetermined orientations **152**. In this regard, the alignment mechanism **150** is illustrated to include a coupling member **154**, which is coupled to the carpal implant **54**, and a plurality of holes **156** that are formed into the wrist bearing component **56**. Each of the holes **156** is sized to receive the coupling member **154** and is defined by a centerline **158** that is spaced circumferentially apart from the centerline **158** of an adjacent hole **156**. Rotation of the wrist bearing component **56** relative to the carpal implant **54** is accomplished via engagement of the coupling member **154** into an associated one of the holes **156** that permits the wrist bearing component **56** to be placed in the installation orientation relative to the radial implant **52**. Those skilled in the art will understand that the coupling member **154** may be removably coupled to the carpal implant **54** so as to provide the surgeon with an option not to use the coupling member **154** should the surgeon need more flexibility in positioning the wrist bearing component **56** relative to the carpal implant **54**. Those skilled in the art will also understand that the coupling member **154** and the holes **156** may be reversed (i.e., the coupling member **154** may be attached to the wrist bearing component **56** and the holes **156** may be formed in the carpal implant **54**).

In another preferred form, the present invention provides a method for implanting a prosthetic wrist **50** between the radius **2** and the portion **6***a* of the carpal bone complex **6** of a patient. The method includes: providing a carpal implant **54** including a body **70**, a ulnar flange **72** and a radial flange **74**, the body **70** having a stem **80** that is arranged along an axis **86**, the ulnar flange **72** being coupled to the body **70** and extending therefrom, the ulnar flange **72** having a lateral bone abutment surface **96**, at least a portion of the lateral bone abutment surface **96** being skewed to the axis **86** of the stem **80** by an angle of less than 90 degrees, the radial flange **74** being coupled to the body and extending therefrom on a side opposite the ulnar flange **72**, the radial flange **74** having a medial bone abutment surface **110**, each of the ulnar and radial flanges **72** and **74** having a bone screw aperture **98***a*, **98***b*, respectively, formed therethrough; resectioning the carpal bone complex **6** along lines that are skewed to an axis of the capitate **20** and which correspond to the distal faces of the ulnar and radial flanges **72** and **74** and the interconnecting flange **84**; forming an opening in the capitate **20** that lies along an axis that is generally coincident with the axis of the capitate **20**; forming a pair of securing apertures **160** (FIG. **2**) into the distal portion **6***a* of the carpal bone complex **6**, one of the pair of securing apertures **160** being formed in the hamate **22**; securing the carpal implant **54** to the distal portion **6***a* of the carpal bone complex **6** such that the stem **80** is at least partially disposed in the opening in the capitate **20** and engaged to the capitate **20**; providing a first and second screws **58**, the first and second screws **58** being appropriately sized to the pair of securing apertures **160** and the bone screw apertures **98***a*, **98***b*; placing the first screw through the bone screw aperture **98***a* in the ulnar flange **72** and the securing aperture **160** in the hamate **22** and securing the first screw to the hamate **22** to bring the lateral bone abutment surface **96** into abutment with an ulnar side of a hamate **22**; and placing the second screw **58** through the bone screw aperture **98***b* in the radial flange **74** and the other securing aperture **160** in the distal portion **6***a* of the carpal bone complex **6** and securing the second screw **58** to the distal portion **6***a* of the carpal bone complex **6** to bring the medial bone abutment surface **110** into abutment with a radial side of the distal portion **6***a* of the carpal bone complex **6**.

Preferably, the method also includes: providing a wrist bearing component **56** having a wrist bearing surface **122** that is defined by a first radius **130** in the coronal plane and a second, different radius **132** in the sagittal plane; coupling the wrist bearing component **56** to a proximal stem **82** formed on the body **70** of the carpal implant **54** such that the wrist bearing component **56** is rotatable relative to the carpal implant **54**; and fixing the wrist bearing component **56** to the proximal stem **82** such that the wrist bearing component **56** is aligned at a predetermined installation orientation relative to the distal portion **6***a* of the carpal bone complex **6**.

While the carpal implant **54** has been described thus far as being unitarily formed and used in conjunction with a discrete wrist bearing component **56**, those skilled in the art will appreciate that the invention, in its broader aspects, may be constructed somewhat differently. For example, the carpal implant **54***a* may be configured to include a discrete flange structure **200** and a discrete stem **80***a* as illustrated in FIG. **8**. The flange structure **200** is unitarily formed from a suitable material, such as CoCrMo, and includes a bone abutment surface **202**. In the particular example provided, the bone abutment surface **202** is shown to include an interconnecting, lateral and medial bone abutment surfaces **90***a*, **96***a* and **110***a*, respectively, which mimic the configurations of the interconnecting, lateral and medial bone abutment surfaces **90**, **96**, **110** (FIG. **3**), respectively.

The stem **80***a* is illustrated to include a tapered cylindrical portion **206**, which is configured to be fitted to a hole that is formed in the capitate **20** (FIG. **2**), and a connecting portion **210** for coupling the stem **80***a* to the flange structure **200**. The tapered cylindrical portion **206** is generally similar to the stem **80** (FIG. **3**) discussed above and includes a porous coating **212**. The coating **212** or surface may also be plasma sprayed or roughened to form an uneven or unsmooth surface and need not be porous.

In the example provided, the connecting portion **210** includes a threaded end portion **220**, which is coupled to a proximal end of the tapered cylindrical portion **206**, and a driving portion **224**, which is coupled to an end of the tapered cylindrical portion **206** opposite the threaded end portion **220**. The threaded end portion **220** is configured to extend through a stem receiving aperture **230** that is formed in the flange structure **200** and threadably engage a threaded aperture **232** that is formed in the wrist bearing component **56***a*. The driving portion **224** is illustrated to include a geometric feature, such as a male hexagon shank **240**, that permits the stem **80***a* to be rotated with an appropriately configured tool **242** such that the threaded end portion **220** threadably engages the threaded aperture **232** in the wrist bearing component **56***a*. Those skilled in the art will readily understand that the driving portion **224** may be of any shape (e.g., triangular, square, Torx®) and may extend from the tapered cylindrical portion **206** in the form of a shank, or be recessed into the tapered cylindrical portion **206**, in which case the tool **242** would have a corresponding male end to engage the driving portion **224**, rather than a corresponding female as illustrated in this example.

With the exception of the threaded aperture **232** and a pair of anti-rotation tabs **246**, the wrist bearing component **56***a* is otherwise identical to the wrist bearing component **56** of FIG. **2**. The anti-rotation tabs **246** are configured to abut a proximal side of the flange structure **200** when the wrist bearing component **56***a* is coupled to the carpal implant **54***a* to thereby inhibit relative rotation between the wrist bearing component **56***a* and the carpal implant **54***a*. Those skilled in the art will appreciate, however, that other anti-rotation means may additionally or alternatively be incorporated into wrist bearing component **56***a* and/or the carpal implant **54***a*, including mating geometric features (e.g., a male hex protrusion formed onto the proximal side of the flange structure **200** and a mating hex recess formed into the distal side of the wrist bearing component **56***a*), fasteners and pins. The use of anti-rotation tabs **246** provides the wrist bearing component **56** with a relatively greater range of motion as comparatively illustrated by the angles α and β.

The modular configuration described above provides the surgeon with a relatively high degree of flexibility when differently sized components are available in a kit form as shown in FIG. **9**. In the example illustrated, several wrist bearing components (i.e., wrist bearing components **56***a* and **56***a*'), several flanges (i.e., flanges **200** and **200**') and several stems (i.e., stems **80***a* and **80***a*') are provided in a kit **250**. The wrist bearing components **56***a* and **56***a*' are configured with an identical articular shape, but vary in their overall height dimension h. Similarly, the flanges **200** and **200'** and stems **80***a* and **80***a*' are similarly configured, but vary proportionally to achieve a desired overall width, w, and/or length, l, for example.

In the embodiments of FIGS. **10** and **11**, the carpal implants **54***b* and **54***c* are generally similar to the carpal implant **54** (FIG. **3**), except for the configuration of the interconnecting, ulnar and radial flanges. In FIG. **10**, the ulnar and radial flanges **72***b* and **74***b*, respectively, intersect one another and as such, this embodiment lacks the interconnecting flange **84** of the carpal implant **54**. The ulnar flange **72***b* is shown to be configured such that the lateral bone abutment surface **96***b* is skewed to the stem axis **86** by an angle of about 30 degrees, while the radial flange **74***b* is shown to be configured such that the medial bone abutment surface **110***b* is skewed to the stem axis **86** by an angle of about 45 degrees. In FIG. **11**, the interconnecting flange **84***c* is configured such that the interconnecting bone abutment surface **90***c* is accurately shaped. In the particular example provided, the interconnecting bone abutment surface **90***c* is tangent to the lateral and medial bone abutment surfaces **96***c* and **110***c*, respectively.

A further embodiment is illustrated in FIG. **12**, wherein the carpal implant portion **54***d* and the wrist bearing portion **56***d* are unitarily formed from a suitable material, such as CoCrMo. In the particular embodiment illustrated, the carpal implant portion **54***d* is illustrated to include ulnar and radial flanges **72***d* and **74***d*, respectively, that intersect one another in a manner that is similar to the ulnar and radial flanges **72***b* and **74***b*, respectively, of the carpal implant **54***b* of FIG. **10**. Those skilled in the art will appreciate, however, that the ulnar and radial flanges **72***d* and **74***d* may be formed differently so as to intersect at any desired angle, or such that they are spaced apart by an interconnecting portion in a manner that is similar, for example, to the configurations of the carpal implants **54** and **54***c* of FIGS. **3** and **11**, respectively.

A sixth embodiment is illustrated in FIGS. **13** and **14**, and illustrates an alternately constructed radial implant **52***e*, wherein the bearing guide **62***e* is formed with an arcuate shape that is configured to matingly engage the curvilinear cut **300** of a resected radius **2***a*'. Those skilled in the art will appreciate that the curvilinear cut **300** will support the bearing guide **62***e* and thereby permit the radial implant **52***e* to be formed with a relatively lower profile as compared to the radial implant **52**.

A seventh embodiment is illustrated in FIG. **15**, wherein the prosthetic wrist **50***f* is illustrated to be generally similar to the prosthetic wrist illustrated in FIG. **8**, except for the shape of the flange structure **200***f* and the wrist bearing component **56***f*. More specifically, the flange structure **200***f* includes a generally V-shaped interconnecting flange **84***f* to which the ulnar and radial flanges **72***f* and **74***f*, respectively, are oppositely coupled. As will be apparent to those skilled in the art, the wrist bearing component **56***f* is contoured to matingly engage the proximal side of the flange structure **200***f* and accordingly includes a generally V-shaped profile **400**. In a manner that is similar to the prosthetic wrist of FIG. **8**, the stem **80***f* includes a threaded end portion **220** that is threadably received into a threaded aperture **232** that is formed in the wrist bearing component **56***f*.

An eighth embodiment is illustrated in FIG. **16**, which is similar to the prosthetic wrist of FIG. **8** except for the flange structure **200***g*. The flange structure **200***g* of the prosthetic wrist **50***g* includes an interconnecting flange **84***g* with an interconnecting bone abutment surface **90***g* with a plurality of portions **500** that are each defined by a skew angle. The skew angles that define each portion **500** need not be symmetrical about the stem axis **86***g*. The skew angle of each portion **500** is less than 90 degrees in magnitude to permit the interconnecting flange **84***g* to conform and abut the proximal end of the distal portion **6***a* (FIG. **2**) of the carpal bone complex **6** (FIG. **2**).

A ninth embodiment is illustrated in FIGS. **17** and **18**. The flange structure **200***h* is generally identical to the flange structure **200***g* and as such, will not be discussed in further detail. The wrist bearing component **56***h* is generally similar to the wrist bearing component **56***a* (FIG. **8**) in that the ulnar (lateral) and radial (medial) portions of the distal side of the wrist bearing component **56***h* are angled to match the angled proximal surfaces of the ulnar and radial flanges **72***h* and **74***h*, respectively. However, the wrist bearing component **56***h* also includes anterior and posterior located portions **600** on the distal sides of the wrist bearing component **56***h* that extend distally in a manner that overlaps the flange structure **200***h*. The configuration of the wrist bearing component **56***h* therefore inhibits both relative rotation and relative anterior-posterior movement between the wrist bearing component **56***h* and the flange structure **200***h*.

A tenth embodiment, which is also similar to the prosthetic wrist **50***g*, is illustrated in FIGS. **19** and **20**. In this embodiment, the flange structure **200***i* is similar to the flange structure **200***g* except that the proximal side of the flange structure **200***i* is parallel to the distal side of the flange structure **200***i* (i.e., the proximal side of the flange structure **200***i* includes a plurality of segments that are parallel to the segments that make up the distal side of the flange structure **200***i*). As will be apparent to those skilled in the art, the wrist bearing component **56***i* is contoured to matingly engage the proximal side of the flange structure **200***i* and accordingly includes a profile **700** that matches the four angled surfaces that make up the proximal side of the flange structure **200***i*.

An eleventh embodiment is illustrated in FIGS. **21** and **22**, wherein the prosthetic wrist **50***j* is illustrated to include a flange structure **200***j* and a wrist bearing component **56***j*. The flange structure **200***j* is generally identical to the flange structure **200***i* and as such, will not be discussed in further detail. The wrist bearing component **56***j* is similar to the wrist bearing component **56***i* in that it includes a profile **700***j* that matches the four angled surfaces that make up the proximal side of the flange structure **200***j*. The wrist bearing component **56***j* also includes anterior and posterior located portions **600***j* on the distal sides of the wrist bearing component **56***j* that extend distally in a manner that overlaps the flange structure **200***j*. Moreover, the flange **200***j*, may be any appropriate geometry to substantially compliment or match the carpal plate.

According to various embodiments, illustrated in FIGS. **21**A and **22**A, wherein the prosthetic wrist **50***ja* is illustrated to include a flange structure **200***ja* and a wrist bearing component **56***ja*. The flange structure **200***ja* is generally similar to the flange structure **200***i* and as such, will not be discussed in further detail. Nevertheless, it will be understood that the prosthetic wrist **50***ja* may include other features and variations. In addition, the flange **200***ja* may include a proximal surface **201***ja* that is a substantially smooth arc or radius, as discussed here.

The wrist bearing component **56***ja* is similar to the wrist bearing component **56***i* in that it includes a profile **700***ja* that substantially matches or compliments the proximal side **201***ja* of the flange structure **200***ja*. The proximal side **201***ja* of the flange structure **200***ja* includes a substantially smooth radius or arc. That is the proximal side **201***ja* may be defined as an arc rather than a plurality of angles. The profile **700***ja* may include a substantially smooth radius or arc that compliments or matches the arc of the flange **200***ja*. Therefore, the flange **200***ja* and the bearing component **56***ja* may substantially mate when assembled.

The wrist bearing component **56***ja* also includes anterior and posterior located portions **600***ja* on the distal sides of the wrist bearing component **56***ja* that extend distally in a manner that overlaps the flange structure **200***ja*. Moreover, the flange **200***ja*, including the proximal side **201***ja*, may be any appropriate geometry to substantially compliment or match the surface **700***ja* of the bearing **56***ja*.

A twelfth embodiment is illustrated in FIG. **23** and includes a flange structure **200***k* and a wrist bearing component **56***k*. The flange structure **200***k* includes a distal surface that is configured generally identically to the distal surface of the flange structure **200***g*. The proximal surface of the flange structure **200***k*, however, is segregated into a plurality of zones **800***a*, **800***b* and **800***c*. Zones **800***a* and **800***c* are generally parallel the ulnar and medial bone abutment surfaces **96***k* and **110***k*. Zone **800***b*, which is coupled at its opposite ends to zones **800***a* and **800***c*, is defined by a radius that tangentially intersects zones **800***a* and **800***c*. The wrist bearing component **56***k* includes a profile **700***k* that matches the proximal surface of the flange structure **200***k*.

In FIGS. **24** and **25**, a thirteenth embodiment is illustrated to include a flange structure **200***m* and a wrist bearing component **56***m*. The distal side of the flange structure **200***m* is configured in a manner that is generally identical to the distal side of the flange structure **200***k* discussed above. The proximal side **900** of the flange structure **200***m*, however, is defined by a spherical radius **902**. In the particular embodiment illustrated, the spherical radius **902** is centered at a point that is disposed along the axis **904** of the connecting portion **210***m*. Those skilled in the art will appreciate, however, that the center of the spherical radius **902** may be positioned otherwise. The wrist bearing component **56***m* likewise includes a distal profile **700***m* that matingly engages the proximal side **900** of the flange structure **200***m*.

In FIGS. **26** and **27**, a fourteenth embodiment is illustrated to include a flange structure **200***n* and a wrist bearing component **56***n*. The flange structure **200***n* is generally similar to the flange structure **200***m*, except that the proximal side **900***n* is defined by a first radius **1002** in the coronal plane and a second radius **1004** in the sagittal plane. The wrist bearing component **56***n* is likewise generally similar to the wrist bearing component **56***m*, except that the distal profile **700***n* of the wrist bearing component is configured with a first radius in the coronal plane and a second radius in the sagittal plane so as to matingly engage the proximal side **900***n* of the flange structure **200***n*.

While some embodiments have been illustrated to include a unitarily formed component, such as a unitarily formed carpal implant, and others have been illustrated to include a component assembly, such as a carpal implant assembly that includes a discretely formed stem and a discretely formed flange structure, those skilled in the art will appreciate that any unitarily formed component may be formed in the alternative utilizing a plurality of discretely formed components and that any embodiment that is shown to be formed using a plurality of discretely formed components may likewise be unitarily formed in the alternative.

With reference to FIG. **28**, the carpal bone complex **6** includes a geometry that also angles or curves about a radius between a volar side **1000** and a dorsal side **1002**. The angle is between the volar side **1000** and the dorsal side **1002** of the carpal complex **6**. Generally the bones including the hamate **22**, the triquetrum **12**, the lunate **10**, the scaphoid **8**, and the trapezium **16** define the dorsal volar curvature or profile of the carpal complex **6**. It may be selected to include the radius defined by the carpal complex **6** in a carpal implant. The carpal implant that includes the dorsal volar radius may allow for a substantially easier implantation of the carpal implant and allow for a more natural orientation of the bones of the carpal complex **6** after implantation of the carpal implant. It will be understood that although specific embodiments are illustrated for a carpal implant including the selected radius, that any carpal implant may include the selected radius to allow for a substantially natural implantation of the carpal implant relative to the carpal complex **6**.

With reference to FIG. **29**, a carpal implant **1010** may be provided that includes a first segment **1012**, a second segment **1014**, and a third segment **1016**. Between the first segment **1012** and the second segment **1014** may be a first angle **1018**. Between the second segment **1014** and the third segment **1016** may be a second angle **1020**. The first angle **1018** and the second angle **1020** provide a radius about the volar side **1022** of the carpal implant **1010** that includes a radius away from the dorsal side **1024** of the carpal implant **1010**. It will be understood that the geometry of the carpal implant **1010** may be included in any appropriate carpal implant, such as various embodiments discussed above and herein. Nevertheless, it will be understood that the geometry of the carpal implant **1010** is not limited to a particular embodiment but may be provided in the various embodiments.

The carpal implant **1010** may include various bores such as a first screw bore **1026** and a second screw bore **1028**. In addition, a third bore **1030** may be provided for positioning the stem **80** (FIG. **3**) that is to pass through the carpal implant **1010**. Regardless, it will be understood that the carpal implant **1010** may be provided with a plurality of portions or included with any of the implants as described above, or herein, so that the first angle **1018** and the second angle **1020** are operable to provide the substantially natural volar radius or dorsal bow for a prosthesis.

With regard to FIG. **29**, a carpal implant **1040** may include a member **1042** that extends between a first end **1044** and a second end **1046**. The member **1042** may define a radius **1048**. The radius **1048** may provide that the member **1042** includes a substantially constant radius or arch between the first end **1044** and the second end **1046**. The arch or angle between the first end **1044** and the second end **1046** may be substantially similar to the arch or angle defined by the carpal implant **1010** except that the angle or arch of the carpal implant **1040** is substantially continuous.

The carpal implant **1040** may also include a plurality of portions. For example, the carpal implant may include a first screw bore **1050** and a second screw bore **1052**. In addition, the carpal implant **1040** may include a post bore **1054** that is operable to receive a post, as described above.

Although the carpal implant **1010** may include a plurality of angles **1018**, **1020**, and the carpal implant **1040** may include a substantially continuous radius **1048**, each may provide an angle or a bow that is substantially similar to the carpal complex **6**. Therefore, the carpal implant **1010**, **1040** may be implanted into an anatomy in a substantially natural manner. It will be understood, in addition, that the portions defining the selected bow or radius may be included in any appropriate carpal implant. For example, the carpal implant **54** may include the selected portions and angles that are substantially angled distally to allow for a formation about the carpal complex **6**. The carpal implant **54** may also include the dorsal bow that may be defined by the angles **1018**, **1020** or the radius **1048**. Therefore, it will be understood that the carpal implant may include a plurality of features to allow it to be implanted into a selected anatomy.

In addition, it will be understood that the carpal implant may be substantially intraoperatively bowed to achieve a selected angle or radius. Therefore, during a procedure, a user, such as a surgeon, may determine that a selected bow or radius is required and forms the implant to the selected radius. This may be done by cold working, hot working, bending or any appropriate manner to form the selected bow or angles. Alternatively, or in addition, the carpal implant may be substantially customized for a selected individual. Therefore, pre- or intraoperative measures may be taken of the patient's anatomy, including the dorsal or volar bow of the carpal complex **6** to allow for a formation of the selected carpal implant to substantially mimic that of the natural anatomy of the patient. This may allow for a more natural implantation of the carpal implant into the anatomy of the patient for a substantially more precise anatomical implantation.

With reference to FIG. **30**, a carpal implant **1100** is provided. The carpal implant **1100** may include a carpal complex engaging side **1102** and a proximal side **1104**. The carpal implant **1100** may include the carpal side **1102** that is generally similar to the above-described carpal implants. For examples the carpal engaging side **1102** may include a first or ulnar section **1106**, a second section **1108**, a third section **1110** (wherein the second section **1108** and the third section **1110** may define a body), and a fourth, ulnar, or augmented section **1112**. The augmented section **1112** may differ from those described above and may be provided to replace a selected bone portion, such as the scaphoid **8** in the carpal complex **6**. The augmented section **1112** may include an augmented or exterior surface **1114** that may substantially replace the articulating surface of the scaphoid **8** during a procedure. Moreover, the augmented portion **1112** may be substantially integral or modular. Therefore, the carpal implant **1100** may include a member operable to receive a selected augmented region **1112** for selection by a user.

The carpal implant **1100** may further include a screw fixation bore **1116** and a post bore **1118**. The screw which may be used to pass through the screw bore **1116** and the post **80** (FIG. **3**) may be similar to those described above. In addition a screw fixation bore **1117** may be formed in the augmented section **1112**. This may allow a fixation screw, such as those discussed above, to be passed through the augmented section **1112** to engage a portion of the carpal complex **6**. This may allow fixing of the carpal implant **1100** to the carpal complex **6** in an appropriate manner. In this way it may also be understood that the surface **1114** does not particularly articulate with a portion of the carpal complex **6** yet the augmented section **1112** is operable to fill a void in the carpal complex **6**, such as due to the removal of a selected bone from the carpal complex **6**. Nevertheless, the augmented section **1112** may be provided to replace a selected boney portion and the remaining boney portions of the carpal complex **6** may articulate therewith, as discussed herein. Although it will be understood that the carpal implant **1110** may be connected to the carpal complex 6 in any appropriate manner, as mentioned above such that that surface **1114** does not articulate with the carpal complex **6**.

The proximal surface **1104** of the carpal implant **1100** may include a substantially continuous convex radius such that it may articulate with a radial implant or a portion of the radius. Alternatively, the carpal implant **1100** may be fixed to a bearing member, such as the bearing member **56**, to articulate with the radial implant. The carpal implant **1110** may allow for articulation of various portions of the carpal complex **6** with the other portions of the complex **6** and the radius **2** to allow for substantial replacement of the natural articulation of the wrist.

With reference to FIG. **31**, the carpal implant **1100** may be positioned in the carpal complex **6** such that the augmented region **1112** replaces the scaphoid bone **8**. Therefore, the augmented region **1112** may be able to articulate with the trapezium bone **16** and the trapezoid bone **18**. The augment region may also articulate with the capitate bone **20** as will be understood by one skilled in the art. Therefore, a screw, such as the screw **58**, may be used to engage the hamate bone **22** and the carpal implant **1110** is allowed to articulate freely with the other boney portions of the complex **6**. Nevertheless, the augmented region **1112** need not articulate with the carpal complex **6**.

The resection of the carpal complex **6** may be similar to a resection otherwise required to implant a carpal implant except that the scaphoid **8** may be replaced with the augmented region **1112**. The articulating surface **1114** may be defined in such a way that the augmented region **1112** is operable to articulate with the selected bony portions to substantially mimic the natural articulation in the wrist. This may be selected if the scaphoid bone **8** is substantially removed due to a resection procedure, an injury, or the like. Therefore, it is not necessary to fix the carpal implant **1110** to a bone portion through the augmented region **1112**, but the other bone portions of the carpal complex **6** may simply articulate with the augment region **1112**. It will be understood, however, that the carpal implant **1110** can be fixed to any selected portion of the carpal complex **6**.

It will be understood that the carpal implant **1110** may include any appropriate augments to engage any selected portions of the carpal complex **6**. Therefore, the augmented region **1112** may be provided to replace the scaphoid bone **8** or other articulating the selected portions of the scaphoid complex **6**. Thus, any appropriate augmented region of the carpal implant **1110** may be provided.

In addition, other various embodiments may include various portions that provide for replacement of selected bone segments such as the augmented region **1112**. Thus, the carpal implant **1110**, according to various embodiments or in conjunction with various embodiments, may be provided to replace a selected or bony portion to allow for a substantially natural articulation within the carpal complex regardless of the condition of the carpal complex. The augmented region **1112** may also be provided to replace other boney portions, such as the lunate **10**. Moreover, the carpal implant **1110**, as mentioned above, may be substantially modular such that the augmented region **1112** may or may not be included. Moreover, the augmented region may be selected to replace a selected bone by selecting a particular module.

In addition, the post **86** may be provided in the carpal implant **1100** to engage the bone portion capitate bone **20** and also engage the selected bearing member **56**. Nevertheless, as discussed above, the radius side **1104** of the carpal implant **1100** may substantially provide an articulating or bearing surface to articulate or bear with the radius **2** or the radial implant **52**, or any appropriate radial implant. Nevertheless, the carpal implant **1110** may articulate both with the radial portion, such as the radius **2**, the radial implant **52**, or any appropriate radial implant, and may also articulate with selected portions of the carpal complex **6**. Therefore, the carpal implant **1100** may include both the radial side articulating surface **1104** and the articulating surface **1114** substantially defined by the augmented region **1112**. Regardless, the carpal implant **1100** may be provided to allow for replacement of selected bony portions, such as those bony portions that are substantially incapable of providing anatomical support or articulation, by use of the augmented region **1112**. Again, such as discussed above, the region **1112** need not articulate with the carpal complex **6** but may fill a mass in the carpal complex **6**.

With reference to FIG. **32**, a distal radial implant **1200** is illustrated according to various embodiments. The distal radial implant **1200** may be provided as a substantially modular implant that includes a stem portion **1202** that is operable to be positioned relative to a selected portion of the radius **2**, such as intramedullary. Affixed or interconnected with a selected portion of the stem portion **1202** is a distal radial segment **1204**. The distal radial segment **1204** may be provided to engage the stem **1202** to provide a selected orientation, configuration, size and other considerations for the distal radial implant **1200**. Furthermore, a distal radial bearing **1206** may be provided that may engage a selected portion of the distal radial segment **1204**. As discussed herein, the bearing **1206** may be fixed to the distal radial segment **1204**, may articulate with the distal radial segment **1204**, or may be provided in any appropriate configuration. In addition, the bearing **1206** may be omitted, as a bearing extending from the carpal implant may articulate with the distal radial segment **1204**. Alternatively, the bearing member **1206** may be omitted, as a carpal implant or portions of the carpal complex **6** may articulate directly with the distal radial portion **1204**. Nevertheless, the modular distal radial implant **1202** may be provided in a manner allowing a user, such as a physician, to select a distal radial implant intraoperatively to substantially match the anatomy of a patient.

With reference to FIG. **33**, the stem **1202** includes a body portion **1208** and a neck or engaging portion **1210**. The neck portion **1210** may include a connection area, such as a male connection post, to engage a respective female connecting area, discussed herein, in the distal radial segment **1204**. For example, the stem connection **1210** may include a groove or detent **1212** that is operable to engage a deflectable member or portion of the distal radial segment **1204**. Nevertheless, the connection member **1210** may be provided to allow for an interconnection of the stem **1202** with the distal radial component **1204**.

The body portion **1208** of the stem **1202** may include a selected geometry. For example, the body portion **1208** may be substantially cylindrical or tapered/conical to allow for easy insertion of the stem **1202** into the radius **2**. The body **1208**, however, may include a selected geometry to substantially resist rotation of the distal radial implant **1200** after implantation. For example, various extensions or keys, such as fins or tabs **1214**, may be provided that extend from an exterior of the body **1208** such that the fins **1214** may engage a selected portion of the bone. In addition, the body **1208** may include a selected irregular geometry or regular geometry that includes portions that may resist rotation. For example, the body **1208** may include a substantially square or rectangular cross-section, may define a substantially "I-beam" cross-section, an oval cross-section, a star cross-section, a cruciform cross-section, or any appropriate cross-section. Nevertheless, the body portion **1208** may be provided for allowing both substantially easy implantation of the modular distal radial implant **1200** and a mechanism to resist rotation of the distal radial implant **1200** after implantation thereof.

Furthermore, the stem **1202** may be provided in a plurality of dimensions, such as a diameter, length, curve radius, cross-section, and combinations thereof. For example, the stem portion **1202** may include a diameter or a cross-sectional size **1216**, a length **1218**, or any other selected dimensions that may be varied. Therefore, a kit **1600** (FIG. **44**), or other appropriate selection may be provided such that one or more of the stems **1202** may be provided with one or more variations in the selected dimensions **1216**, **1218**. For example, in the kit **1600**, a plurality of the stems **1202** may be provided where each of the stems **1202** include a slightly different length **1218** such as about 4 cm, about 6 cm, and about 8 cm. Therefore, during a procedure, such as an implantation of the distal radial implant **1200**, a user, such as a physician, may select the appropriate length for the stem **1202**.

With reference to FIGS. **34**A and **34**B, the distal radial segment **1204**, according to various embodiments, is illustrated as the distal radial segment **1204***a*. The distal radial segment **1204***a* may include portions that are operable to engage the stem **1202**. Nevertheless, the distal radial portion **1204***a* may be formed according to various embodiments, including various embodiments exemplary illustrated herein, or combinations thereof.

The distal radial component **1204***a* generally includes a body portion **1230** and a superior or articulating portion **1232**. The body portion may be formed in any appropriate manner to engage a selected portion of the anatomy. The body **1230** may include selected dimensions such as a length **1234**, a width **1236**, a height **1238**, and an arch or radius **1240**. The various dimensions **1234**, **1236**, **1238**, and **1240** may be varied for various applications. As discussed above, and in conjunction with the stem **1202**, a plurality of the distal radial segments **1204***a* each including a unique set of dimensions **1234-1240** may be provided. Each may be provided in a large inventory or in the kit **1600** (FIG. **44**) for selection by a user substantially intraoperatively or preoperatively. Nevertheless, various sizes or configurations of the distal radial implants **1204***a* may be provided to allow for a substantially customized fit with a selected patient.

The distal radial component may also include the articulating region or portion **1232** that may also include a plurality of selected dimensions. For example, the articulating region **1232** may include a length **1242** and a width **1244**. The articulating region **1232** may also include an articulation depth **1246** that may vary depending upon a selected application. The articulation depth **1246** may generally be understood to be the deepest portion of the concave region **1248** that defines the articulating surface of the articulating region **1232**. The uppermost portion of the height **1246** may be a point where the articulating surface stops or transforms into a lip **1252**. Therefore, the upper portion **1250** of the articulating surface may extend to the edge of the articulating region **1232** or may stop intermediate thereof. Again the articulating region **1232** including the various dimensions **1242-1246** may be varied and unique for a plurality of the implants **1204***a*. Therefore, again, the user may select the distal radial implant **1204***a* according to selected requirements or dimensions of a patient.

The distal radial implant **1204***a* may define a selected geometry of the body **1230**. For example, the body may include a single or plurality of depressions **1254** for various reasons. For example, the depressions **1254** may assist in allowing for a fixation of the distal radial implant **1204***a* to a selected portion of the anatomy. In addition, the body **1230** may be substantially smooth over the surface thereof or include other various selected geometries. Again a plurality of geometries may be selected for various uses during an implantation.

The articulating region **1232** may include the first lip **1252** and a second lip **1256**. The lips **1252**, **1256** may extend a distance beyond an edge of the body **1230**. The lips **1252**, **1256** may be dimensioned depending upon a selected portion of the anatomy or a selected patient.

Defined in the body **1230** is a female receiving or interconnection portion or depression **1260**. The female interconnection **1260** may include a dimension that allows for substantial interconnection with the male interconnection **1210** of the stem **1202**. The reception or interconnection portion **1260** may include a deformable member (such as a canted coil spring or screw or other mechanism) **1262**, or screw which may engage the depression **1212** of the stem **1202**. Therefore, the distal radial component **1204***a* may be interconnected with the stem **1202** for an implantation. It will be understood, that the body **1230** may define a male connection and the stem define a female connection. Thus the interconnection may be performed in any appropriate manner and these are merely exemplary.

With reference to FIGS. **35**A and **35**B, a distal radial implant **1204** according to various embodiments of a distal radial implant **1204***b* is illustrated. The distal radial implant **1204***b* includes portions similar to the distal radial implant **1204***a* and like numerals will be used to indicate like portions. The distal radial implant **1204***b* includes a body portion **1270** and an articulation portion **1272**. The body **1270** may be substantially similar to the body **1230** of the distal radial implant **1204***a*. Nevertheless, the articulation region **1272** may include a projection or flat spot **1274**. The flat spot **1274** may be viewed as a portion of the body **1270** but extends a distance substantially parallel to a base **1276** of the body **1270**. The flat portion **1274** may substantially abut a distal portion of the radius **2** during and after implantation. Therefore, the flat portion **1274** may allow for a substantially stable interconnection with the radius **2** after the implantation. Alternatively, the flat portion **1274** may be provided for a further connection or fixation portion to engage the radius **2**.

Nevertheless, the distal radial implant **1204***b* may include the plurality of dimensions **1234**, **1236**, **1238**, **1240**, **1242**, **1244**, and **1246**. As discussed above, the plurality of dimensions may be substantially unique and different among a plurality of the distal radial implants **1204***b* for a modular interconnection and selection by a user. In addition, the flat portion **1274** may be provided on the distal radial implant **1204***b* as one of a plurality of the distal radial implants **1204** that may be provided in an inventory or the kit **1600** for use by a user. Therefore, the distal radial implant **1204***b* may be provided for forming a distal radial implant **1200** depending upon a selected patient.

With reference to FIGS. **36**A and **36**B, a distal radial implant **1204** according to various embodiments of a distal radial implant **1204***c* is illustrated. The distal radial implant **1204***c* may include portions that are similar to the portions of the distal radial implant **1204***a* and like numerals are used to reference like portions of the distal radial implant **1204***c*. In addition, it will be understood that the distal radial implant **1204***c* may include portions that are selectable to be used with other various embodiments of the distal radial implant **1204***a* and the distal radial implant **1204***c* is merely exemplary.

The distal radial segment **1204***c* includes a body **1280** that may be similar to the body **1230** of the distal radial implant **1204***a*. Therefore, the body **1280** may also include the female engaging portion **1260** operable to engage a selected portion of the stem **1202**. Nevertheless, as discussed above, the female engaging portion **1260** may be any appropriate size, configuration and the like. In addition, any appropriate portion may be provided to engage the stem **1202**. In addition, the body **1280** may include selected portions, such as depressions, dimensions and the like that may be substantially different for a selected use or patient.

Extending distally from the body **1280** is the carpal engaging region or portion **1282**. The carpal engaging region **1282** can extend from the body **1280** to engage a selected portion of the carpal complex **6**. The bones of the carpal complex **6** may be held within the carpal engaging portion **1282** so that the bones of the carpal complex **6** are operable to articulate in a generally natural manner but may be held relative to one another to allow for a fixation of the wrist relative to the distal portion of the radius. Essentially the holding portion **1282** may surround a selected number or volume of the carpal complex **6** to allow for retention of the natural boney portion after implantation of the distal radial segment **1204***c*.

The distal radial segment **1204***c* may be provided for a substantially hemi-arthroplasty where substantially only the distal portion of the radius **2** is replaced. The distal radial segment **1204***c* may articulate with the carpal complex **6** to reduce the need for a carpal implant. Further, distal radial segment **1204***c* can include an ulna articulation portion **1452**, as discussed further herein. This articulation section can allow for a selected articulation of the ulna **4** with the distal radial segment **1204***c*.

With reference to FIG. **37**, the distal radial implant segment **1204***c* may be implanted to substantially capture or surround selected portions of the carpal complex **6** such as the scaphoid **8**, the lunate **10**, the triquetrum **12**, and the trapezium **14**. Therefore, if any portions of these bones are resected or if the portions of the carpal complex **6** are left substantially whole, they may be enclosed within the carpal complex portion **1282** of the distal radial implant **1204***c* It will be understood that the containing portion **1282** may be shaped and sized for any appropriate application and may include a selected geometry for holding or fixing a selected number of the bones of the carpal complex **6**. Moreover, a bearing component may be fit or molded onto the container portion **1282** to allow for a substantially smooth articulation of the various bones of the carpal complex **6** relative to the distal radial implant segment **1204***c*. The ulna **4** can be positioned relative to the implant member **1282** at any appropriate position and me be near the surface or deeper based upon various characteristics.

Returning reference to FIGS. **36**A and **36**B, the distal radial implant segment **1204***c* includes the carpal engaging section **1282** which may include a plurality of selected dimensions. For example, the carpal containing section **1282** may include a selected high or ulnar side **1284** and a radial side **1286**. This may allow for the carpal engaging section **1282** to substantially mimic the natural shape of the distal radial portion and how it would engage the carpal complex **6**. For example, the distal radial implant **1204***c* may engage and hold the carpal complex bone **6** in a selected orientation and shape. Therefore, the high side **1284** may include high side height **1288** and a low side **1286** may include a low side height **1290**. Furthermore, the carpal containing section **1282** may include a length **1292** and a width **1294**. Therefore, the carpal containing section **1282** may include a plurality of dimensions **1288-1294** that may be selected and varied depending upon a particular patient or user. In addition, as discussed above, a plurality of the radial distal implants **1204***c* may be provided in either an inventory or kit **1600** for selection during a procedure to allow for a substantial customization of the implant for a selected patient.

Nevertheless, the carpal containing selection **1282** may allow for holding a selected number of the carpal bones in the carpal complex **6** in a selected manner for a substantially natural articulation. The carpal containing section **1282** may hold portions of the carpal complex **6** in a manner such as to allow for an articulation of even a weakened or fractured carpal complex. In addition, the carpal containing section **1282** may be used when various portions of the anatomy may be resected, such as removal of the entire proximal row of the carpal complex **6**. In addition, the carpal containing section **1282** may retain resected portions of the bone segments that form the proximal row of the carpal complex **6** and may allow for collecting the portions of the carpal complex in such a manner to allow for articulation of the carpal complex **6** relative to the radius **2** by way of the distal radius segment **1204***c*.

With reference to FIGS. **38**A and **38**B, a distal radial implant **1204** according to a various embodiment of a distal radial implant **1204***d* is illustrated. The distal radial implant **1204***d* may include portions similar to the distal radial implant **1204***a* and like numerals are used to indicate like portions.

The distal radial implant **1204***d* may be similar to the distal radial implant **1204***c* in that both may be used for a substantially hemi-arthroplasty of the wrist including a resurfacing or arthroplasty of substantially only the radius bone **2** or the distal radial portion. Therefore, the distal radial segment **1204***d* may include a body **1290** that includes the female engaging portion **1260**. The distal radial implant segment **1204***d* may interconnect with the stem **1202** to allow for formation of a selected distal radial implant. In addition, the body portion **1290** may include selected detents and other formations to allow for an implantation of the distal radial implant **1204***d* into a selected anatomy.

Extending from the body portion **1290** is an articulating or carpal portion **1292**. The carpal portion **1292** may include a ulnar or first side **1294** and a radial or second side **1296**. Extending between the two sides **1294**, **1296** is a surface, such as an articulation surface **1298**. The articulation surface **1298** may be a substantially metal articulation surface that does not necessarily require a bearing, such as a polymer bearing. The articulating surface **1298** may be used to articulate with a selected portion of the carpal complex in a substantially hemi arthroplasty replacement. Therefore, the articulating surface **1298** may be substantially a metal, or any other appropriate material, including a plastic, ceramic, pyrocarbon (also referred to as pyrolytic carbon) portion such that the body **1290** and the articulating region **1292** may be formed as a substantially single portion.

The articulating region **1292** may be provided in such a manner to articulate with a selected portion of the carpal complex **6** in a way that allows for replacement of only the distal portion of the radius **2** without augmentation of the carpal complex **6**. Therefore, particularly in selected situations such as a fracture, chip and the like of the radius **2**, the distal radial implant **1204***d* may be used to resurface the selected portion of the radius **2** without requiring a carpal implant.

The articulating region **1292** may include selected dimensions such as a height **1300**, a length **1302**, and a width **1304** that may be different or selected depending upon a use or patient. For example, a selected size of the carpal complex **6** may require a selected size of the articulating region **1298** to engage the carpal complex **6** in a selected manner. In this way, the articulating portion **1298** may articulate with the carpal complex **6** to allow for replacement of substantially only the distal portion of the radius **2** rather than a replacement of a portion of the carpal complex **6** and a carpal implant.

Although the articulating region **1298** may be a substantially metal or hard material, such as a ceramic or pyrocarbon, articulating region, it will be understood that the articulating region **1298** may also include a bearing. The bearing may include a polymer bearing, such as a bearing formed of a ultra-high molecular weight polyethylene or any other appropriate bearing portion. Alternatively, the bearing surface **1298** may simply be a highly polished surface which allows for substantially easy, smooth articulation of portions of the carpal complex **6** relative to the distal radial implant segment **1204***d*. It will be understood, therefore, that the various distal radial implants **1204** may be used for a complete or hemi arthroplasty of the radius **2**.

With reference to FIGS. **39**A and **39**B, a bearing component **1206** according to selected embodiments of a bearing component **1206***a* is illustrated. The bearing **1206***a* may be interconnected with a selected distal radial implant **1204** according to various embodiments. Therefore, it will be understood that the bearing portion **1206***a* may be affixed to a selected one of the distal radial implants such as the distal radial implant **1204***a*.

The bearing components **1206***a* includes an articulation or carpal bearing side **1310** that defines a bearing surface **1312**. The bearing component **1206***a* also defines a distal radial bearing side **1314**. The distal radial bearing side **1314** defines a distal radial bearing surface **1316**. The distal radial bearing surface **1316** is provided to substantially seat within the bearing side **1232** of the distal radial implant **1204**.

The bearing **1206***a* may be substantially fixed to the distal radial component **1204***a* in any appropriate manner. For example, the bearing **1206***a* may be adhesively affixed, mechanical affixed, welded, otherwise bonded, or the like. For example, a selected deformable or engagable lip or edge **1318** may be provided to engage the lip **1252** and, **1256** of the distal radial implant **1204***a*. Alternatively, various locking portions such as screws, bars, and the like may substantially interconnect the bearing components **1206***a* with the distal radial components **1204***a*. Therefore, the bearing components **1206***a* may substantially be held relative to the distal radial component **1204***a* allowing for a substantially stable base of articulation of the carpal complex **6** and portions of the wrist relative to the varying portion **1206***a* and the distal radial implant **1204***a*.

The articulating surface **1312** of the distal radial implant **1206***a* may allow for articulation of selected portions of the distal carpal complex **6**. The carpal complex **6** may be allowed to articulate within the articulating surface **1312** to allow for a natural articulation of the wrist relative to the implant **1200**.

Alternatively, the articulating surface **1312** may be provided to articulate with a selected portion of the carpal implant according to various embodiments. For example, the carpal bearing member **56** may be provided to articulate within the articulating surface **1312** of the bearing member **1206***a*. Therefore, a total wrist replacement may be provided that includes the carpal implant **54** and the carpal bearing implant **56**. The carpal bearing implant **56** may include a substantially polymer or a substantially metallic surface. Nevertheless, it is generally selected to provide a metal on polymer bearing articulation such that the bearing member **1206***a* may be formed of either a polymer or a metal portion.

Alternatively, a carpal implant such as the carpal implant **1100** may be provided. The articulating surface **1104** of the carpal implant **1100** may be allowed to articulate with the articulating surface **1312** of the bearing member **1206***a*. Therefore, the carpal implant **1100** may be implanted relative to the carpal complex **6** and may then articulate with the bearing **1206***a*. Therefore, no additional or separate bearing components may be necessary and the bearing **1206***a* may divide the bearing portion between the carpal implant **1100** and a selected distal radial implant segment **1204**.

As discussed above, the distal radial bearing **1206***a* may be substantially molded to the distal radial implant segment **1204** to allow for a fixation of the bearing components relative to the distal radial segment **1204**. Thus, the modular component may be provided to allow for a minimal amount of portions that are necessary to be implanted to form a substantially total wrist arthroplasty.

With reference to FIGS. **40**A and **40**B, a distal radial bearing member **1206***b* which is a distal bearing member according to various embodiments of the distal radial bearing member **1206** is illustrated. The distal radial bearing member **1206***b* may be provided with any of the selected distal radial implant segments **1204**. According to various embodiments, the distal radial implant **1206***b* may be interconnected with the distal radial implant **1204***b*.

For example, the distal bearing implants **1206***b* may be substantially molded or adhered to the distal radial implant **1204***b* similar to the fixation of the distal radial bearing portion **1206***a*. Therefore, various fixation mechanisms such as an adhesive, a screw, a locking bar and the like may be provided. For example, a substantial locking tab or projection **1350** may be provided to engage a rim or section **1272** of the distal radial implant **1204***b*. The distal radial bearing member **1206***b* also includes an articulation side **1352** that defines a bearing surface **1354**. The bearing surface **1354** may articulate with a selected portion of the carpal complex **6** or a selected portion of a carpal implant.

As discussed above, the articulation surface **1354** may articulate with a bearing portion of a carpal implant **54** or any appropriate bearing portion of a selected various embodiment of a carpal implant. In addition, the articulation surface **1354** may articulate with an articulating surface **1104** of the carpal implant **1100**, discussed above. Therefore, either the carpal implant **1100** alone may articulate with the bearing member **1206***b* or a separate bearing portion, which is interconnected with a carpal implant, may articulate with the bearing surface **1354** of the bearing implant **1206***b*.

In addition, the bearing portion **1206***b* includes a flat or flat extending portion **1356** that extends proximally away from the articulating side **1352**. The flat portion **1356** may extend around the flat portion **1274** of the distal radial implant **1204***b*. This may allow for providing a portion of the bearing member around a selected portion of the distal radial implant **1204***b* for selected purposes. The extending or flat member **1356** may define a void **1358** which is operable to engage or receive a selected portion of the flat portion **1274** of the distal radial implant **1204***b*.

The bearing portion **1206** according to various embodiments, including the exemplary embodiments, **1206***a* and **1206***b*, may include various dimensions, such as height **1360**, a length, **1362** and a width **1364** or a plurality of dimensions. Therefore, the bearing component **1206** according to various embodiments may include a substantial plurality number of unique and selectable dimensions for various applications. Therefore, a user may select one of a plurality of the varying components **1206** to meet selected requirements of a particular patient. The user may select an implant from the kit **1600** (FIG. **44**), an inventory or the like to provide an implant for the requirements of a selected patient.

Therefore, it will be understood that the modular distal radial implant **1200** may include a plurality of the stems **1202**, a plurality of the distal radial segments **1204**, and a plurality of the distal radial bearing components that may be selected and interconnected in various and selected manners. This allows for the distal radial implant **1200** to be provided as a substantially selectable implant for various particular patients and uses by a user, such as physician. The modular assembly may also allow for a substantial intraoperative selection of the implant for a particular patient by a physician or user. Thus, the implantation may proceed while allowing for a substantially intraoperative customization of the implant **1200** to the patient. In addition, the modular implant **1200** may be easily augmented or portions replaced during a revision procedure due to the modular nature of the implant **1200**.

As briefly discussed above, it will be understood that various implants may be provided as substantially hemi-arthroplasty or total wrist replacement. For example, the carpal implants, such as the carpal implants **54** or the carpal implant **1100** may be provided to interconnect with selected portions of the carpal complex **6** to substantially articulate with a natural portion of the radius and ulna, as illustrated in FIG. **45**. Therefore, a hemi-arthroplasty of the wrist joint or the wrist area may be provided by only resurfacing or providing the carpal implant. As discussed above, the carpal implant may include a size to interconnect with a plurality of the bones of the carpal complex **6** or may also replace a selected portion of the bones of the carpal complex **6**. Regardless, the carpal implant may be provided to articulate with a natural portion of the radius.

Likewise, the distal radial implant according to various embodiments may be provided to substantially articulate with a natural portion of the carpal complex, as discussed above and herein. Therefore, the distal radial implant may be provided to articulate with a selected carpal implant or articulate with selected portions of the carpal complex **6**.

As discussed above, the various portions of the distal radial implant may include a substantially modular distal radial implant **1200**. The distal radial implant **1200** may include a plurality of distal radial portions **1204** which may include a plurality of the distal radial implant segments **1206** from which may be chosen one to articulate with a natural portion of the carpal complex **6**, a carpal implant, or a combination thereof. Therefore, in the kit **1600** or a supply, the selected implant may be chosen to include the distal radial implant portion **1200** that is operable to interconnect or articulate with a natural portion of the carpal complex **6** or the carpal prosthesis. It will be understood that this may be done substantially intraoperatively such that a user, such as a physician, is able to choose from the kit **1600** or selecting the portions that are required intraoperatively to allow for a substantial customization regarding the selected patient.

With reference to FIG. **41**, a distal radial implant **1400** according to various embodiments is illustrated. The distal radial implant **1400** generally includes a stem **1402** and a distal radial segment **1404**. It will be understood that the distal radial segment **1404** may be substantially modular from the stem **1402**, such as the modular radial implant **1200**. Therefore, the stem **1402** may be substantially similar to the stem **1202** and the distal radial portion **1404** similar to the distal radial portion **1204**. Thus, the distal radial portion **1404** may be provided in the kit **1600** or supplied to be interconnected with a selected one of the stems **1202** for formation of the distal radial implant **1400**. Regardless, it will be understood that the distal radial implant **1400** may be substantially provided as a single member for implantation and may also be included in the kit **1600** of modular portions.

The distal radial segment **1404** generally includes a body portion **1406** that is interconnected with the stem **1402**. As discussed above, the body portion **1406** and the stem **1402** may be substantially formed as a single member such that the distal radial portion **1404** is not substantially separable from the stem **1402**. Such a configuration may be selected for various reasons, such as strength, materials, and the like. Regardless, the distal radial portion **1404** may define an articulation region extending distally from the body **1406**.

The articulating side **1408** may include a first articulating fossa or surface **1410** and a second articulating fossa or surface **1412**. The first articulating surface **1410** may substantially replicate a scaphoid fossa for articulation with a scaphoid bone **8** after implantation. The second articulation surface **1412** may be designed to substantially articulate with the lunate bone **10** after implantation. Therefore, the articulating surface **1408** of the distal radial segment **1404** may be designed to substantially replicate the natural articulating surfaces of the radius **2**. This may allow for a substantially natural articulation of the carpal complex **6** relative to the radius **2** after a hemi-arthroplasty regarding a resurfacing or replacement of the distal portion of the radius **2**.

The articulating surface **1408** may include a bearing portion that is substantially fixed to the body **1406**. Alternatively, the articulating surface **1408** may include the substantially identical material to the body **1406**. For example, the body **1406** may be formed of a selected metal or metal alloy and the articulating surface **1408** may be provided as a substantially polished surface to allow for a selected articulation of the scaphoid **8** and the lunate **10** relative to the distal radial segment **1404**.

The articulating surface **1408** may be defined substantially flat or straight across the articulating surface **1408**. Although the articulating surface **1408** may include the depressions **1410** and **1412** to define the articulating surfaces, the articulating region **1408** may be substantially straight across its upper surface to as not to substantially hinder movement of the carpal complex. Therefore, the distal radial segment **1404** may include a height **1414**, a selected length **1416**, and a width **1418**.

As discussed above, it will be understood that the various dimensions **1414-1418** may be substantially unique among a plurality of the distal radial segments **1404** for selection by a user substantially intraoperatively or preoperatively. Regardless, this allows the user to substantially select the portion for the distal radial implant **1400**, or a modular portion for the distal radial implant **1200** to substantially suit a selected patient. Therefore, the user may be able to select whether to provide a hemi-arthroplasty or complete wrist replacement during the operative procedure depending upon the state of the patient.

With reference to FIG. **42**, a distal radial implant **1450** according to various embodiments is illustrated. The distal radial implant **1450** may include portions that are substantially similar to the distal radial implant **1400** and similar reference numerals are used to reference like portions. Therefore, the distal radial implant **1450** may include the stem **1402** and a distal radial segment **1404**.

As discussed above, the stem **1402** may be substantially modular relative to the distal radial segment **1404** to provide for a modular implantation of the distal radial implant **1450**. In addition, a plurality of the stems **1402** and the distal radial segments **1404** may be provided for selection by a user. Alternatively, a plurality of a fully integrated distal radial implant **1450** may be provided. Therefore, the stem **1402** may be substantially integral with the distal radial segment **1404** or may be provided separately therefrom for interconnection during an operative procedure.

The articulating region **1408** of the distal radial implant **1450** may include the first articulating portion **1410** and the second articulating portion **1412**. The first articulating portion **1410** may be provided to articulate with the scaphoid **8**. As discussed above, the second articulating portion **1412** may be provided to articulate with the lunate bone **10**.

Depending upon a selected patient's anatomy, the ulnar side of the distal radial segment **1404** may also include a recess **1452** for articulation with the ulna **4**. As will be understood by one skilled in the art, the radius **2** may articulate with the ulna **4** during an anatomical motion (such as pronation or supination) of the wrist or arm portion and this may become damaged. Therefore, during an operative procedure which may be required or replacement or a resurfacing of the distal radial portion, the preparation of the radius **2**, such as a resection thereof, may require removing the articulating region of the radius **2** that would generally articulate with the ulna **4**. Therefore, using the distal radial implant **1450**, including the recess **1452**, may substantially allow an articulation of the ulna with the implant **1450** connected to the radius **2**, after implantation of the distal radial implant **1450**, in a substantially natural manner. It will be understood that the recess **1452** may be provided with any selected embodiment or in various embodiments of the distal radial implant and the distal radial implant **1450** is merely exemplary. For example, the recess **1452** can be added to the distal radial segment **1204***c* (FIGS. **36**A and **36**B).

In addition, the distal radial implant **1450** may include a curve or curvilinear portion **1454** that may be provided to substantially engage or hold a selected portion of the carpal complex **6** in a selected location. The carpal complex **6**, such as after a trauma, may be unstable and require additional stabilization or retainment in a selected anatomical orientation. Therefore, the curvilinear portion **1454** may be provided on the distal radial implant **1450** for holding the selected portion of the carpal complex **6** in a location. It will be understood, again, that the curvilinear portion **1454** may be provided on any selected implant for holding the carpal complex **6** in a selected location.

Therefore, it will be understood that the illustrated embodiments are merely exemplary and not intended to limit the scope of any exemplary embodiments. Regardless, providing an articulating surfaces **1410** and **1412** that allows for substantially natural articulation of the carpal complex **6** relative to the distal radial implant **1400**, **1450** may be selected to include further restricting portions such as the curvilinear portion **1454**. Similarly, a resection of the radius **2** may allow or be selected to use the recess **1452** to create an articulation region for the ulna.

With reference to FIG. **43**, the distal radial implant **1450** is illustrated exemplary implanted into a selected anatomy. The stem **1402** is implanted into the radius **2** to provide a fixation of the distal radial implant **1450** relative to the radius **2**. The distal radial segment **1404** is positioned at an end, such as the distal end of the radius **2** after preparing the radius **2** for the implantation. The curvilinear portion **1454** is provided to retain a selected portion of the anatomy, such as the scaphoid **8** relative to the distal radial implant **1450**. The first fossa **1410** is positioned to articulate with the scaphoid **8** while the second fossa **1412** is positioned to articulate with the lunate **10**. In addition, the depression **1452** is provided to allow an articulation of the distal portion of the ulna **4** with the distal radial implant **1450**.

Therefore, the implantation of the distal radial implant of **1450** may provide for articulation relative to the substantial natural or anatomical carpal complex **6** rather than positioning a carpal implant relative to the carpal complex **6**. It will be understood that the distal radial segment **1404** may also include a bearing portion such as a polymer portion that may articulate with the bony portions such as the scaphoid **8** and the lunate **10**. Regardless, as discussed above, the articulating surfaces **1410**, **1412** may be substantially polished metal portions to allow for a smooth articulation of the natural portions of the carpal complex **6**.

Therefore, it will be understood that each of the exemplary embodiments may include portions that are substantially dissimilar from the selected exemplary embodiments and may include combinations of each of the various embodiments. Therefore, the exemplary embodiments are not intended to limit the scope of the following claims but merely are provided to exemplify the portions thereof. Therefore, with reference to FIG. **44**, the kit **1600** or supply may include a plurality of the stem portion **1202***a*, **1202***b* that each include a selected unique dimension, such as a length **1208***a*, **1208***b*, respectively. Furthermore, the kit **1600** may provide a plurality of distal radial portions **1204***a*, **1204***b*, **1204***c* to provide a distal radial portion according to any of the various embodiments. Also, the kit **1600** may provide a plurality of distal radial bearing members **1206***a*, **1206***b* that are operable to provide any of the various embodiments discussed above. The kit may be used by a user during procedure to select and assemble a distal radial implant that is substantial customized to a selected patient.

Furthermore, the kit **1600** may provide a plurality of the carpal implants, such as the carpal implant **54** according to various embodiments, or the carpal implant **1100** and the bearing **56** according to various embodiments for selection by a user. In this way, a user may select to provide a hemi-arthroplasty to provide a prosthesis relative to the carpal complex **6** alone or relative to the radius **2** alone. Alternatively, the user may select to provide a substantially total wrist replacement that will provide a distal radial implant and a carpal implant. While selecting either of the total wrist arthroplasty or the hemi-arthroplasty, the user may also select various portions that may be provided to allow for a customized implant relative to the patient. The selection may occur substantially intraoperative due to the kit which includes a plurality of members which may be assembled to form the selected prosthesis.

As discussed above, various implant portions, such as the distal radial implant **1415**, can be used to articulate with a selected natural portion of the carpal complex **6**. For example, if a fracture or other injury, due to an action or disease, of the distal radius, the distal radius can be replaced relative to the carpal complex **6**. Although the carpal complex **6** may be substantially unharmed due to an injury or disease, the distal radius may necessitate replacement or a natural articulation may be improved by replacement of the distal radius portion. Therefore, the distal radius portion can be replaced with a selected implant, including those discussed above, and those described herein. As discussed above, the distal radial implant can be provided in the kit **1600** to include a plurality of portions, such as the stem portion **1202** and a plurality of the distal radial portions **1206**. Therefore, a selected user, such as a physician, can select an implant combination that is suitable or appropriate for a selected patient. The selection can be based upon the amount of resection required, the condition of the bone, or other appropriate considerations.

As discussed herein, various implant portions and selections can be used to achieve a selected result for a procedure. Although any appropriate procedure can be used, exemplary methods are described herein to achieve a selected result for a selected ailment. For example, a distal radial implant can be used to replace a fractured distal radius portion. As discussed above, the implants can include both a carpal replacement and a distal radial replacement. Nevertheless, it may be selected, that only a distal portion of the radius need be replaced or is appropriately replaced. Therefore, the distal radius can include a portion that can articulate with the natural carpal complex in a substantially anatomical or natural manner or with a carpal implant.

With reference to FIG. **46**, a distal radial implant **1470** according to various embodiments is illustrated. The distal radial implant **1470** can include the stem portion **1202** or any appropriate stem. The stem portion **1202** can be formed in any appropriate manner and in any appropriate length. As discussed above, the stem portion **1202**, can be provided in a plurality of sizes such as widths, lengths, geometries and the like for selected implantations. Nevertheless, the stem portion **1202** can be provided in a kit, such as that described herein or above, that includes substantially single shape, size, geometry or the like and can be interconnected with a plurality of other modular sections.

The distal radial implants **1470** can include a distal radial portion or member **1472**. The distal radial portion **1472** can include a first section **1474** that includes a region to interconnect with the stem portion **1202**. The interconnection portion **1476** can include any appropriate connection portion such as a taper, a thread, a locking portion, or the like. For example, as described above, the stem portion **1202** can include a thread region **1212** that can interconnect with an internal thread in the connection region **1476**.

The distal radial portion **1472** can further include a carpal engaging area **1478**. The carpal engaging area **1478** can include an articulation surface or articulation region **1480**. The articulation surface **1480** can be formed in any appropriate manner to articulate the selected portion of the carpal complex **6** or carpal implant.

The articulation surface **1480** can include a lowermost region **1480'** that extends a distance **1482** above a surface **1483** defined by the carpal engaging region **1478**. The distance **1482** can be formed at any appropriate dimension for various purposes, such as substantially or selectively matching a selected anatomy. Generally, the distance **1482** can be about 0.25 mm to about 2.0 mm, or any appropriate dimension. Nevertheless, it will be understood that the distal radial portion **1472** can be provided in a plurality of sizes, including a plurality of the dimensions **1482** for selection from a kit by a user, as discussed herein.

Further, the distal radial portion **1472** can be formed of any appropriate material. For example, the entire distal radial portion **1472** can be formed of a polymer material, such as a high density polyethylene, a metal, a metal alloy, or a combination thereof. Also, the stem engaging portion **1474** can be formed of a metal or metal alloy while the carpal engaging portion **1478** can be formed of a polymer material. The polymer material can interconnect with the metal material in any appropriate manner, such as with a locking tab, be molded onto the stem engaging portion **1474**, or any appropriate attachment. Nevertheless, it will be understood that the distal radial portion **1472** can be formed of any appropriate material or combinations of materials for selected purposes.

With additional reference to FIG. **47**, the carpal engaging section **1478** defines the articulating surface **1480** that can articulate with a selected portion, such as the carpal complex **6**. It will be understood that the carpal articulating section **1478** can also articulate with a selected implant, such as a carpal implant, including those described above or any appropriate carpal implant. The articulating portion of the carpal implant can articulate with the carpal articulation surface **1480** in a selected manner. Alternatively, the distal radial portion **1472** can be replaced in a revision or selected procedure to implant a distal radial portion that is appropriately suited to articulate with a selected carpal implant.

In addition to the carpal articulation surface **1480**, an ulna articulation surface or recess **1484** can also be provided. The ulna articulation recess **1484** is operable to articulate with a selected portion of the ulna **4** after implantation of the distal radial member **1472**. This can allow for a generally natural articulation of the ulna **4** after implantation of the distal radial portion **1472**. The ulna articulation recess **1484** can be formed in any appropriate manner to appropriately articulate with the ulna **4**.

A first wall or portion **1486** and a second wall or portion **1488** can bound the carpal articulation surface **1480**. This can help hold the various portions of the carpal complex **6** in a selected manner after positioning the distal radial member **1472**. Therefore, the carpal complex **6** can be maintained substantially intact and can be held to allow for a substantially anatomical or natural articulation with the distal radial member **1472**.

In addition to various embodiments, including those various embodiments described above, a distal radial implant can be provided with a plurality of modular portions. With reference to FIGS. **48** and **49**, a distal radial implant **1500** is illustrated. The distal radial implant **1500** can include various portions such as a stem **1502**. The stem **1502** can be similar to the stem **1202**, described above. Regardless, the stem **1502** can generally be positioned in a portion of the bone, such as an intramedullary canal of the radius **2** to hold the distal radial implant **1500** in a selected position. The distal radial implant **1500** can further include a bone replacement portion **1504**. The bone replacement portion **1504** can be provided for various selected anatomies and procedures, such as those described herein.

The bone replacement portion **1504** can include a selected dimension, such as a height **1506**. The height **1506** can be provided in a plurality of different heights, such as height **1506***a*, **1506***b*, **1506***c*, **1506***d*, **1506***e* and **1506***f*, illustrated in phantom. It will be understood, as illustrated in the kit **1590** (FIG. **50**) that the bone replacement portion **1504** can be provided in a plurality of sizes including at least one of the heights **1506-1506***f*. Therefore, it will be understood that the height **1506-1506***f* is a height that can be selected by a user, such as a physician, to replace a selected amount of bone that may be damaged, resected, removed, or the like. The bone replacement portion **1504** can also include a dimension such as a width **1508**. The bone replacement portion **1504** can further include a plurality of widths **1508**.

The distal radial implant **1500** can further include an articulating or carpal articulating section or portion **1510**. The articulation portion **1510** can include a high walled or high side **1512** that includes a selected height **1514**, and can also be included in a plurality of the heights **1514**. Further, the carpal articulating portion **1510** can further include a low side **1516** that can include a second height **1518**. Similar to the first height **1514**, the second height **1518** can be provided in a plurality of dimensions along with a plurality of the carpal engaging a carpal articulating section **1510**.

With continuing reference to FIGS. **47** and **48**, the various modular portions of the distal radial implant **1500** can be provided according to selected embodiments. For example, the stem **1502** can include an engaging section **1520** that can engage an engaging portion **1522** in the bone replacement section **1504**. The engaging section **1520** can include external threads while the bone replacement portion **1504** can include internal threads in the engaging portion **1522**. This can allow the stem **1502** to be inserted into the IM canal of the radius **2** and the bone replacement portion **1504** to be threaded onto the stem **1502**. Alternatively, or in addition thereto, a screw or bolt can be passed through the bone replacing portion **1504** to engage the stem **1502**. Further, various other locking portions, such as a locking ring, or any other appropriate mechanism can be provided to interconnect the bone replacing portion **1504** with the stem **1502**.

Further, the stem **1502** can include any appropriate geometry, extensions, shaped, or the like to engage the radius **2**. For example, the stem **1502** can include an I-beam or other appropriate geometry to allow for fixation or rotation resistance after implantation of the stem **1502** into the bone, such as the radius **2**. Further, various fins similar to the fins **1204** on the stem **1202**, can be provided. Regardless, the stem **1502** can be interconnected with the radius **2** in a selected manner to allow for positioning of the distal radius implant **1500** Also, the stem **1502** and the bone replacement portion **1504** can be interconnected prior to implantation.

The stem **1502** can include a plurality of mechanisms to interconnect with the bone replacement portion **1504** as discussed above. Nevertheless, the bone replacement portion **1504** can include any appropriate geometry to replace a selected portion of the anatomy, such as a distal portion of the radius **2**. Although the distal portion of the radius **2** may be resected for any appropriate reason such as injury, disease, and the like, the geometry of the bone replacement portion **1504** can be formed as a modular member or be custom formed for a selected individual based upon various considerations. Nevertheless, the bone replacement portion **1504** can include a stem connecting portion **1522** which can be any appropriate portion. Also a keel **1523** can extend from the bone replacement portion **1504** to engage bone to assist in maintaining a position of the portion **1504**, such as to resist rotation.

Further, the bone replacement portion **1504** can include a plurality of the heights **1506** and the widths **1508**. It will be understood that the difference between the various heights **1506** can be any appropriate increment, such as 1 mm, 2 mm, 3 mm, 4 mm, any fraction thereof, or any multiple thereof. Thus the bone replacing portion **1504** can be provided as a plurality of components in the kit **1590** or a kit according to any various embodiments for selection by a user. It will be understood, however, that the bone replacing portion can be provided in any appropriate manner. For example, the bone replacing portion **1504** can be telescopic. The telescopic bone replacing portion **1504** can include a single member than can be adjusted to various heights, such as selected by a user. The telescopic bone replacement portion may be infinitely adjustable or may include a plurality of discrete adjustments. Regardless, it will be understood that the bone replacement portion **1504** may be provided as one or a plurality of members and can be provided in the kit **1590**.

Further, the bone replacing portion **1504** can be formed of any appropriate material such as a polymer, a metal, a metal alloy, a ceramic, or any combination thereof. For example, the bone replacing portion **1504** can be formed of a metal that can interconnect through the stem **1502** and may also be formed of a metal or metal alloy. Thus the connection between the stem **1502** and the bone replacing portion **1504** can be substantially strong and stable over a long period of time.

Further, the bone replacing portion **1504** can include a top portion or articulating connecting portion **1530**. The articulating connecting portion **1530** can include a projection **1532** that extends above a ledge or depression **1534**. This can allow the articulating portion **1510** to surround or encase a portion of the bone replacement member **1504** and to receive it within a depression area **1536**. This can allow for a substantially strong interconnection between the articulating portion **1510** and the bone replacing portion **1504**. Nevertheless, it will be understood that the articulating portion **1510** need not completely surround any portion of the bone replacing portion **1504** and the bone replacement portion **1504** may alternatively include a portion that surrounds a portion of the articulating member **1510**. Therefore, it will be understood that any appropriate interconnection can be formed between the bone replacement portion **1504** and the articulating member **1510**.

Further, a bore **1538** can be formed through the articulating connection region **1530** that is operable to receive a locking member, such as a bolt **1540**. The bolt **1540** can include a threaded end **1542** and a driving end **1544**. The threaded end **1542** can engage a threaded portion of the bore **1538** or a threaded portion of the articulating region **1546**. The articulating region **1510** can also include a bore portion **1548** through which the bolt **1540** can pass. This can allow the bolt **1540** to selectively interconnect to the articulating member **1510** with the bone replacement member **1504**. The bolt **1540** can pass through each of the bores **1548**, **1538** and engage the threaded region **1546** to securely interconnect to the articulating member **1510** with the bone replacement member **1504**. It will be understood, nevertheless, that the articulating member **1510** can interconnect with the bone replacement member **1504** in any appropriate manner. In other words, the bolt **1540** is not necessary and any other appropriate connection can be used, such as a taper, a locking ring, an adhesive, or any other selected connection.

The articulating member **1510** includes the various articulating surfaces. The articulating member **1510** can include a carpal articulation surface **1550**. The carpal articulation surface **1550** can articulate with any appropriate portion, such as a carpal implant, a portion of the carpal complex, or any of the selected bones of the carpal complex **6**. Therefore, the carpal articulation surface **1550** can be provided to interact with any of the appropriate portions or the articulating member **1510** can be specialized for articulation with the selected portion. The articulating surface **1550** can be formed at any appropriate distance above a bottom **1552** of the articulating member **1510**. The distance **1554** can be any appropriate distance and can differ among the various members of the articulating member **1510**. For example, the kit **1590** can include a plurality of the articulating member **1510** that can be used in the distal radial implant **1500**. Therefore, a user can achieve a selected result by forming or selecting one of the articulation members **1510** that include a selected articulation surface **1550** for implantation.

In addition to the carpal articulating surface **1550**, the articulating member **1510** can also include an ulna articulating surface **1560**. The ulna articulating surface **1560** can allow for an interconnection or articulation of the ulna with the articulating member **1510**. Therefore, the distal radial implant **1500** can replace substantially all of the articulations of the distal portion of the radius **2** for various purposes. Therefore a user can resect the distal portion of the radius **2** and replace it with the distal radius implant **1500** and substantially achieve a selected anatomical or natural articulation.

The various portions of the distal radial implant **1500** can be formed as a single piece member so that the stem **1502**, the bone replacement member **1504**, and the articulating member **1510** are not separate modular members. Although, each of these various portions can be formed as a single member they can also be formed as a plurality of portions that can be interconnected. Further, each of the portions can be formed as a single piece with one or more of the other portions. Therefore, each of the stem **1502**, the bone replacing member **1504**, or the articulating member **1510** can be provided as modular portions that can be interconnected with any of the other portions in a slightly less modular system or in a single piece system for a selected implantation. Thus, one skilled in the art will understand that the system can be more modular or less modular based on various considerations and manufacturing techniques or purposes.

For example, a single piece member, illustrated in FIG. **50** can be provided. A single piece implant **1700** can to include portions that are substantially similar to that of the implant **1500**, but they can be formed as a single piece or unit. For example, the single piece implant **1700** can include a stem portion **1702**, a bone replacement portion **1704**, an articulation portion **1706**, and an ulnar articulation portion **1708**. Each of these portions can be similar to portions found in the implant **1500** save that they are formed as a single member or unit. It will be understood, however, that various portions may still be modular in the implant **1700**. For example, an articulating portion can interconnect with the articulating portion **1706**, such as a bearing surface or bearing member. Therefore the single piece implant **1700** can be formed of a selected material, such as a metal, and a polymer articulating portion can interconnect with the articulating portion **1706**.

Though the bone replacement portion **1704** can be formed as one piece it can also be formed in a plurality of sizes or dimensions, such as height, **1710**. For example, the single piece implant **1700** can be provided as a plurality of members (**1700***a*, **1700***b*, **1700***c*) in the kit **1590** that each include a different height **1710**. The height **1710** can vary between the various implant by any appropriate amount such as 1 mm, 2 mm, 3 mm, 4 mm, or any appropriate fraction or multiple thereof. Thus, it is understood that the single piece implant **1700** can be provided in addition to, or alternatively to, the modular implant **1500**. Further, the height **1710** can be varied in any appropriate manner such as providing a plurality of the single piece implant **1700** providing a telescopic bone replacement portion **1704**, or members that may interact over the stem **1702**.

For example, the height **1710** can be altered by providing a modular member **1718** that includes a central bore **1720** that includes a geometry that would allow it to interact with the stem portion **1702**. Therefore, the augmenting member **1718** can be fit over the stem portion **1702** to engage the bone replacement portion **1704**. This would augment the height **1710** of the bone replacement portion **1704** by the height of the augmenting member **1718**. The stem **1702**, however, can still allow for connection of the single piece implant **1700** to the bone portion, such as the radius **2**. The augmenting portion **1718** can be connected to the single piece implant **1700** or be held in place by fixation of the implant **1700** to the anatomy. Regardless, the implant **1700** can be provided as a substantially complete implant or be augmented by other portions, such as the augment portion **1718**.

Various portions, such as the articulating member **1510** can also be formed of more than one material. For example, the articulating member **1510** can include a base **1570** that is formed of a first material and an articulating area **1572** formed of a second material. The base **1570** can be formed of a strong or hard material such as a metal or metal alloy that can substantially interconnect with the bone replacing portion **1504**. The articulating surface or upper portion **1572**, however, can be formed of a portion that can articulate with a bone member in a substantially long lasting or natural manner. Therefore, the upper portion **1572** can be formed of any appropriate material, such as a polymer including a high density polyethylene, a selected metal or metal alloy, a pyrolytic carbon, a ceramic, or any appropriate material. Therefore, various portions of the implant **1500**, such as the articulating member **1510**, can be formed of a plurality of materials to achieve a selected result. Further, the articulating member **1510** can be formed of various materials depending upon whether it articulates with a natural bone, such as a bone with a carpal complex **6**, or with a member that can replace a selected portion of the carpal complex **6**.

Further, the articulating member **1510** can be provided in the kit **1590** according to various embodiments that can be selected based upon an observed condition. For example, during a surgical planning, it may be determined that a live view by a user, such as a physician, is necessary to determine whether any of the carpal bones need to be replaced. Therefore, a kit **1590** can include both an articulating member **1510**, that is able to articulate with a natural bone and one that is able to articulate with an implant for the carpal complex **6**.

In addition to the distal radial implant **1500** a carpal implant can be provided to articulate directly with a portion of the radius **2**, with reference to FIG. **20**. As will be understood by on skilled in the art a hemi-arthroplasty of the wrist can also include replacement of substantially only the carpal bones **6**. Thus the carpal implant **50**, according to various embodiments can be implanted into the carpal complex to articulate with a natural portion of the radius **2**. Further, as discussed herein the kit **1590** can also include the carpal implant **50**. Thus, a user can determine intraoperatively whether a hemi-arthroplasty can be performed, on either of the radius or the carpal complex **6**.

Further, as discussed herein, the modular distal radial implant **1500** can be assembled to articulate with the natural carpal complex **6** or with the carpal implant **50**. Also, as discussed herein, the articulating member **1510** can be changed during a revision procedure to articulate with a carpal implant implanted during a revision procedure. Thus, it will be understood, that a hemiarthroplasty or total arthroplasty of the wrist can be performed. If a hemiarthroplasty is selected it may be of either the distal radius or the carpal complex **6**.

The kit **1590**, with reference to FIG. **51**, can include the distal radial implant **1500**, or any distal radial implant according to various embodiments. The distal radial implant **1500** can be provided in modular pieces, such as those discussed above, or as a single piece member. For example, however, the articulating member **1510** can be provided in various sizes and configurations, such as **1510***a*, **1510***b*, and **1510***c*. The various sizes can be selected by a user, such as a physician, based upon an observed requirement or position. The various sizes of the implant members can be provided in the kit **1590** and the user can select them either pre-operatively or intra-operatively. Therefore, the various portions of the kit **1590** can be provided whether or not the user has pre-operatively determined a selected size or determines intra-operatively the configuration for a selected patient.

Further, the kit **1590** can include a plurality of the bone replacement portions **1504**, such as the portions **1504***a*, **1504***b*, and **1504***c*. Each of the various bone replacement portions **1504** can include a different height **1506**, such as those discussed above. It will be understood that any appropriate number of the bone replacement portions **1504** can be provided, such as 10 bone replacement portions **1504** each including a different height **1506** that differs by about 1 mm. Nevertheless, it may be selected to provide less or more of the bone replacement member **1504** based upon a selected procedure or use. As mentioned above, however, a single bone replacement member **1504** can be provided that includes a telescopic portion.

Further, the kit **1590** can include the stem **1502** in a plurality of sizes or configurations such as the stem **1502***a*, the stem **1502***b*, or the stem **1502***c*. Again, the different sizes or configurations of the stems **1502** can be provided for selection by a user either pre-operatively or intra-operatively. Nevertheless, the plurality of the sizes, configurations, or the like can be used by a user to achieve an optimal or a selected result.

The kit **1590** can further include the connecting member **1540** such as the bolt. It will be understood that various other connecting members may be provided if selected. For example a snap ring, a cotter pin, or other devices can be provided.

The kit **1590** can also include, or alternatively include, the implant **1700**. The implant **1700** can be included in a plurality of sizes **1700***a*, **1700***b*, and **1700***c*. Each of these sizes can vary by any appropriate amount, as discussed above. Also, it will be understood, that the kit **1590** can include only the implant **1700** and not the implant **1500**, or both.

The kit **1590** can further include a carpal implant or replacement portion. The carpal implant can be provided according to various embodiments or provided according to a plurality of embodiments. Further, the carpal implant can be provided in a plurality of sizes. The carpal implant can include a flange of various sizes **200'**, **200''**, **200'''**. The carpal implant can be provided in the kit **1590** to include the stem **87'**, **80''**, **80'''**, in various sizes. Also the wrist bearing component **56'**, **56''**, **56'''** can be provided in the kit **1590** in various sizes. It will be understood that any appropriate number of sizes of the various components can be provided in the kit **1590**, and three sizes is merely exemplary.

Therefore, the user can obtain the kit **1590** and intra-operatively determine an appropriate or more optimal configuration. Thus, not only can the user determine whether a hemi-arthroplasty of either the carpal bones or the radius is selected or whether a hemi- or total arthroplasty is required to replace both the distal radius and the carpal bones. Further, the user can determine and select the amount of radial resection and the user may select a size of the bone replacement member to achieve a result. The user may also determine an appropriate size or configuration of the stem **1502**, the articulating member **1510** and other appropriate considerations. It will be understood, however that the kit **1590** can include more modular components or instruments. For example, various adhesives, impacters, drill motors, reamers, saws, or the like can be used or provided in the kit **1590** for use by a user. Nevertheless, the various modular components are illustrated in the kit **1590** merely for purposes of the present discussion.

It will be understood that the implant members, such as the distal radial implant **1500**, can be used according to any appropriate method, such as for a hemi-arthroplasty, a total arthroplasty, or any selected procedure. Nevertheless, the distal radial implant **1500** can be used according to the method described herein and illustrated in FIGS. **52-55**. It will be understood that the following method described and illustrated is merely exemplary and not intended to limit the application or scope of the present teachings.

With initial reference to FIG. **52**, the radius **2** may include a fracture **1600**. The fracture **1600** can be formed according to any appropriate reason, such as an injury, a disease, or the like. Nevertheless, the fracture **1600** can be formed in a radius **2**, such as in a distal region of the radius **2** that may be replaced with a distal radial implant, such as the distal radial implant **1500**. The fracture **1600** may be determined according to any appropriate procedure, such as an x-ray, a magnetic resonance imaging scan, a computer tomography scan, or the like. Nevertheless, once the fracture **1600** is discovered, a user, such as a physician, may determine whether the fracture **1600** can heal under natural or anatomical conditions or whether a portion of the radius **2** may be replaced with a distal radial implant. It will be understood that the fracture **1600** in the radius can be unique and none of the carpal bones in the carpal complex **6** may be compromised or fractured or various bones in the carpal complex **6** may also be injured.

To achieve a resection of the radius **2**, an incision **1602** can be formed through various soft tissues **1604** of a patient. The soft tissue **1604** can include skin, dermis, muscle, tendons, ligaments, adipose tissue, and other soft tissue portions. Nevertheless, the incision **1602** can provide access to the radius **2** near the region of the fracture **1600**. After the incision **1602** has been formed, it can be augmented with various instruments, such as a retractor **1606**. The incision **1602** can therefore be made into any appropriate dimension, but can initially be formed in an appropriate dimension to achieve access to the radius **2** for resecting a portion of the radius **2** and implanting a selected prosthesis. For example, the incision **1602** can include a dimension, such as a length of the incision that is about 1 cm to about 15 cm. This can achieve a reduced invasive procedure for either a hemi- or a total arthroplasty of any portion of the wrist. After the incision **1602** is formed, any appropriate resecting instrument, such as a saw **1608**, that is interconnected with an appropriate motor **1610** can be used to resect a selected portion of the radius **2**. For example, the radius **2** can be resected near the incision **1600** or proximal to the fracture **1602**.

With reference to FIG. **53**, the radius **2** can be resected any appropriate amount, such as at a distance of **1612**. The distance **1612** can be any appropriate amount and may depend upon the position of the fracture **1600**, the strength of the bone surrounding the fracture **1600**, or any other appropriate consideration. Nevertheless, the distance of the resection **1612** can be used to assist in selecting an appropriate size for the bone replacement member **1504**. Also, the user, such as a physician, can monitor or observe the anatomy of the patient to determine whether or what size of the bone replacement portion is appropriate for a selected patient regardless of the amount of bone resected. The resection distance **1612** can be similar or related to the dimension, such as the height **1506** of the bone replacement member **1504**.

With reference to FIG. **54**, the radius **2** is initially resected at an appropriate location to allow repair of the fracture **1602**. It will be understood that once the radius **2** has been resected a selected amount, that various preparatory steps can be performed to allow for implantation of the distal radial implant **1500**. For example, the IM canal of the radius **2** can be reamed with any appropriate tool to allow for application of the stem **1502** into the radius **2**. Further, a reaming or resection of a portion of the radius **2** can be performed to allow for positioning of the keel **1523** of the bone replacement portion **1504**. As discussed above, the keel **1523** can interconnect with a selected portion of the radius **2** to resist rotation of the bone replacement portion **1504** after implantation thereof. Therefore, it will be understood that the radius **2** or any other appropriate bone portions, such as bones of the carpal complex **6** or the ulna **4** can be prepared for implantation of the distal radial implant **1500** or any appropriate distal radial implant according to various embodiments. Further, it will be understood that the radius **2** or any other bone portions need not be prepared for implantation of the various portions of the distal radial implant **1500**, but rather the various portions of the distal implant **1500** can be interconnected with the radius **2** and implanted therein, such as with impaction.

The stem **1502**, with reference to FIG. **54**, can be positioned in the IM canal of the radius **2**. The stem **1502** can be positioned in the IM canal in any appropriate manner. For example, the IM canal can be reamed to prepare an opening for positioning the stem **1502** therein and for positioning various other materials, such as antibiotics, adhesives, bone cements or the like. Alternatively, or in addition thereto, the stem **1502** can be driven or impacted into the IM canal of the radius **2** without any prior preparation. Regardless, the stem **1502** can be positioned relative to the radius **2** to allow for interconnection of the various other portions of the distal radial implant **1500**.

The bone replacement portion **1504** can be selected based upon the anatomy of the patient. The bone replacement portion **1504** can be connected to the stem **1502** either before or after the stem is positioned in the radius **2**. As discussed above, the amount of resection **1612** can be used to select the bone replacement portion **1504**. For example, it may be selected that the entire amount of resection **1612** can be replaced with the bone replacement portion **1504**. The articulating portion **1510** would then only replace the articulating surface or geometry of the radius **2**. Alternatively, the bone replacement portion **1504** may only replace a portion of the bone resected **1612** and the articulating member **1510** can also replace a portion of the resected bone and the articulating surfaces. Nevertheless, the various sizes provided in the kit **1590** can be used by a user, such as a physician, to achieve the selected result with the patient.

Also, the various members or trialing components can be used to trial various sizes to achieve an optimum or selected configuration for the distal radius replacement **1500**. The trialing components, though not specifically illustrated, can be substantially similar to the components of the distal radial implant **1500**. The trialing components can simply be temporarily interconnected to allow trialing of the articulation of the carpal complex **6** relative to the radius **2** and the ulna **4** to achieve a selected anatomical or natural articulation.

The bone replacement portion **1504** can be selected from a plurality of sizes provided in the kit **1590**, as described above. Once the selected bone replacement portion **1504** is selected from the kit **1590**, it can be interconnected with the connecting portion **1520** of the stem **1502**. As discussed above, the keel portion **1523** can be positioned in a reamed out area in the radius **2** or simply impacted into the radius **2**. Alternatively, or in addition thereto, the keel **1523** may not be provided and the bone replacement portion **1504** contacts a resected surface of the radius **2**. Regardless, various other components, such as antibiotics, other medications, cements, or the like, can be provided to interconnect the bone replacement portion **1504** with the radius **2** and the stem **1502**. It will be understood that the various components can be sized and orientated to be passed through the incision **1602** formed in the soft tissue **1604**.

With reference to FIG. **55**, the articulating member **1510** can be positioned relative to the bone replacement portion **1504**. As discussed above, the articulating member **1510** can be provided in a plurality of heights **1514**, **1518** and a user, for implantation relative to the radius **2**, can select an appropriate height. The articulating member **1510** further includes an articulating surface **1550** that can articulate with various portions of the carpal complex **6**. It can be further understood that the depth or height of the articulating surface **1550** can also vary and be selected. Therefore, again, the user can select an appropriate articulating member **1510** that can include any appropriate orientation of the articulating surface **1550**.

Further, the articulating member **1510** includes the ulna articulating surface **1560** with which the ulna **4** can articulate. Therefore, the appropriate dimensions of the articulating member **1510** can also include determining the appropriate location of the articulating surface **1560** for the ulna.

Nevertheless, the user, such as the physician, can select an appropriate articulating member **1510** from the kit **1590**. Further, it will be understood that the trialing portion for the articulating member **1510**, though not specifically illustrated, can be provided for trialing to determine an appropriate dimension, geometry, and like of the articulating member **1510**.

Once the appropriate articulating member **1510** has been selected, it can be interconnected with the bone replacing portion **1504**. The locking member, such as the locking screw **1540**, can be provided through the incision **1602** to lock the bone replacing member **1504** with the articulating member **1510**. Any appropriate driver, such as a hex head driver **1620**, can be provided to interconnect the bone replacing portion **1504** with the articulating member **1510**. The driver **1620** can be manual or powered to assist in interconnecting or positioning the locking member **1540**.

Therefore, it will be understood that the distal radial replacement **1500** can be interconnected with the radius **2** to replace a selected portion of the anatomy. Though the reasons for the positioning of the distal radial member **1500** can be varied, a fracture can indicate positioning the distal radial implant **1500** relative to the radius **2**. As discussed above, the various modular portions can be provided in the kit **1590** to allow for selection by a user of an appropriate geometry, size, orientation and the like.

Further, the modular portions of the distal radial implant **1500** can allow for easy revision or changing of the implant. Since the bone replacement portion **1504** can be modular from the stem **1502** and the articulating member **1510** can be modular from both the stem and the bone replacing portion, the various portions of the implant **1500** can be individually selected for implantation. Further, if a revision procedure is required or indicated, a user, such as a physician, can select to do a replacement of the articulating member **1510**, the bone replacement member **1504**, or any appropriate portions and replace them with a selected other portions. For example, the articulating member **1510**, that can initially be used or allowed to articulate with the natural bone of the carpal complex **6** and can be later replaced to articulate with the carpal implant **50**. Therefore, during a revision procedure, the articulating member **1510** can be removed from the modular implant **1500** and replaced with a portion that can articulate with the carpal implant. Further, during a revision or second procedure, the articulating member can be replaced with a replacement articulating member of varying configurations as selected by a user. Therefore, the modular implant **1500** can allow for ease of revision procedure or for the intraoperative determination of an appropriate implant assembly.

In addition to the various modular assemblies discussed above, which can be used in hemi- or total wrist arthroplasties, various other modular members can be used. The modular members can be included for various reasons, such as fracture fixation, soft tissue fixation, bone replacements, or any other appropriate purposes. As discussed above, various modular portions can be provided for bone replacement of a selected amount of bone depending upon the amount of bone that is resected or damaged. Further, various modular, semi-modular components, or single piece components can be provided for fracture fixation or stabilization.

With reference to FIG. **56**, a distal humeral implant or system **2000** is illustrated. The distal radial implant **2000** can include a stem **2002**, which can be any appropriate stem, such as the stem **1502**, stem **1202**, or any appropriate stem. It will be understood that the stem can be substantially cylindrical, annular, polygonal, "I"-shaped, "T"-shaped in cross-section, or the like. The stem **2002** can be fit or implanted into a selected bone portion, such as the radius **2**, to assist in holding a bone replacement section **2004** relative to the radius **2**, as illustrated herein. The stem **2002** cannot only hold the bone replacement section **2004** relative to the radius **2**, but may also assist in anti-rotation, or the like of the implant **2000**. Also projections **2003**, at any appropriate shape, size, etc., can be provided to extend from the bone replacement portion **2004** and engage the bone **2** (FIG. **57**). One skilled in the art will understand that an alternative projection portion **2003'** can also be provided. The alternative projection **2003'** can include an outer dimension to engage a portion of the bone **2** and also in clued a region to engage or receive the stem **2002**. The projection **2003'** can be any appropriate portion to engage the bone, including those taught above. One skilled in the art will also understand that more than a single projection can be provided.

The distal radial prosthesis **2000** can also include a flange member **2006**. The flange member **2006** can be formed as a single piece with the bone replacement portion **2004**. Alternatively, the flange **2006** may be completely or partially modular as discussed further herein. In addition, a flange or flange extension **2008** can be provided to interconnect with the flange **2006** in any appropriate manner, including those discussed herein. The distal radial assembly **2000** can be interconnected in any appropriate fashion and implanted into an anatomy, such as interconnected with the radius **2**.

The bone replacement portion **2004** can include appropriate portions or sections. For example, the bone replacement portion **2004** can include an ulnar articulation section **2010**. The ulna articulation section **2010** can allow for articulation with the natural ulna **4**, a prosthesis and/or a graft that are connected with the ulna **4**. Further the bone replacement portion **2004** can include a carpal complex articulation section **2012**. The carpal articulation region **2012** can articulate with a portion of the carpal complex **6**, a carpal bone replacement prosthesis, including those discussed above, and/or any other appropriate portion.

The bone replacement portion **2004** can also be provided in a plurality of sizes. For example, the bone replacement portion **2004** can include a height **2014** that can vary between a plurality of bone replacement portions and can be selected for various purposes. Further, as discussed above, a modular member **2016** can be provided to interconnect with a proximal bone contacting side **2018** of the bone replacement portion **2004** to assist in adjusting the height **2014** of the bone replacement portion **2004** if only a single bone replacement portion **2004** is provided. As discussed above, the distal radial prosthesis **2000** can be included in a kit, such as the kit **1590**. The kit **1590** can include the bone replacement portion **2004** in a plurality of sizes or include a plurality of the augment members **2016**. The augment members **2016** can be similar to the augment member **1718** (FIG. **50**) and perform a similar function. For example, the augment member **2016** can include a central aperture **2020** to pass over a portion of the stem **2002**. The augment **2016** can allow the stem **2002** to assist in positioning the augment portion **2016** relative to the bone replacement portion **2004**.

The bone replacement portion **2004** can be formed of any appropriate material, such as a metal, a metal alloy, a polymer, synthetic material, composite of metals, polymers, pyrolytic carbon, or other appropriate materials. It will be understood that the bone replacement portion **2004**, the stem **2002**, the augment portion **2016**, and the flange extension **2008**, can be formed of any appropriate material. The bone replacement portion **2004**, however, can be formed partially or completely of a material that is appropriate for articulation with the carpal complex **6** or the ulna **4**. Any appropriate material can be used for this, such as an ultra high molecular weight polyethylene, pyrolytic carbon, and other appropriate materials.

The flange **2006** can be formed integrally or as a single portion with the bone replacement portion **2004**. The flange **2006** can be also integrated into the bone replacement portion **2004** in any appropriate manners, such as welding, melding, melting, casting, forging, or the like. The various techniques can also include mechanical connections such as a screw or latch. Nevertheless, the flange **2006** can include a connection section **2022** that is formed near a selected portion of the flange **2006**, such as an end thereof. The connection portion **2022** can be used to interconnect with various members, such as the flange extension **2008**, or with a structure to which the distal radial prosthesis **2000** is positioned. For example, a screw or other appropriate member can be passed through the connection portion **2022** to connect to a selected portion of bone, such as the radius, or the flange extension **2008**.

The flange extension **2008** can be interconnected with the flange **2006** at the interconnection portion **2022** for various purposes. For example, the flange **2006** may be provided in a substantially single length in the kit **1590** or the kit **1590** may include a plurality of the flange extensions **2008** of different sizes to allow for use in multiple or plurality of different situations. It will be understood that although the flange **2006** can be provided in a plurality of lengths with a plurality of the bone replacement portions **2004**, the flange extension **2008** can also be provided to extend a length of the flange **2006** relative to the bone replacement portion **2004** for various purposes.

The flange extension **2008** can include a flange interconnection portion **2024** that can allow for interconnection of the flange extension **2008** with the interconnection portion **2022** of the flange **2006**. For example, a bolt or flange connection screw **2026** can be provided to interconnect the flange extension **2008** with the flange **2006**. Other appropriate mechanisms, such as a cotter pin, rivet, adhesive, ball joint, snap-fit, or the like may be used to interconnect the flange extension **2008** with the flange **2006**. Further, as briefly discussed above, the flange **2008** can be provided in a plurality of sizes, such as in the kit **1590**, to be selectively interconnected with the flange **2006** to achieve a selective length.

The flange extension **2008** can include or define bone connection portals or apertures **2028** that can allow for interconnection of the flange extension **2008** with a selected bone portion, such as the radius **2**. An appropriate bone connection member, such as a screw **2030** can be provided to interconnect the flange extension **2008** with the appropriate bone member. The screw **2030** is merely exemplary and any appropriate connection portion can be provided, such as a pin, a pop rivet, an anchor, a bolt, or any other appropriate connection member.

The bone connection apertures **2028** can be provided in any appropriate manner, for example, the apertures **2028** can be threaded, smooth, partially threaded, countersunk threaded, or the like. Further, it will be understood that the apertures **2028** can include machine threads to engage a machine thread portion of the screw **2030** while the screw **2030** can include a shank **2032** that includes substantially bone-engaging threads. It will be further understood that the screw **2030** can interconnect with the apertures **2028** of the flange extension **2008** to assist in resisting or eliminating back out of the screw **2030**.

The distal radial prosthesis **2000** can be used for any appropriate purpose, such as for implantation into the radius **2**, exemplary illustrated in FIG. **57**. It will be understood that the prosthesis **2000** can be implanted in various embodiments in any appropriate bone portion or any appropriate bone segments and a distal radius **2** is merely exemplary. As discussed above, the radius **2** can be prepared in any appropriate manner, such as illustrated and discussed in relation to FIG. **53**. Briefly, a selected portion of the distal radius can be resected, such as the distance **1612** and an appropriate size of the bone replacement section **2004** or an appropriate combination of the bone replacement section **2004** and the augment members **2016** can be selected from an appropriate inventory, such as the kit **1590**.

Once the appropriate distance **1612** has been resected of the radius **2** and the appropriate bone replacement portion **2004** has been selected, the radius **2** may still include or be injured with a fracture **2040**. The fracture **2040** can be a fracture, such as a severely comminuted spiral, or diaphysal fracture. The fracture **2040** can be formed in the radius **2** at any time, such as when the radius may have been injured, requiring the distal radial implants **2000**. The fracture **2040**, however, may also have occurred after the initial procedure of implanting the prosthesis **2000** when only a portion of the initial flange **2006** is included. A flange or the flange extension **2008** can then be added at any appropriate subsequent time. It will be understood, therefore, that the distal radial prosthesis **2000** can be used both for a primary and a revisionary procedure, depending upon the appropriate requirements. Nevertheless, the flange **2006** and/or the flange extension **2008** can be provided to extend a distance proximally along the radius **2** from the bone replacement portion **2004**. This may be selected, for example, if the extreme distal portion of the radius **2002** was unsalvageable, due to an injury, disease, or the like. But a proximal portion of the radius **2** is salvageable, and includes a weakness or injury, such as a fracture **2040**. The flange **2006** and flange extension **2008** can extend generally parallel to or at an angle to the longitudinal axis of the stem **2002**.

The flange extension **2008** can be interconnected relative to the flange **2006** in an appropriate manner. As discussed above, the flange interconnection mechanism **2026** can be used to interconnect the flange extension **2008** with the flange **2006**. At any appropriate time, the bone connection screws **2030** can also be passed through selected portals **2028** of the flange extension member **2008** or the flange **2006** to interconnect with the radius **2**. As illustrated, the bone screws **2030** can pass through selected portions of bone, including the radius **2**, to provide a fixation of the bone relative to the prosthesis **2000** and also provide for a compression force, such as to assist in healing.

The bone screws **2030** can pass through both a first portion **2**A and a second portion **2**B of the radius **2** to span the fracture **2040** and assist in providing a compressive force relative to the portions **2**A, **2**B of the radius **2**. Therefore, the fracture **2040** can be held and stabilized with the bone screw **2030** and the flange **2006** or the flange extension **2008**. It will be further understood that various soft tissue members can be interconnected with the flange **2006**, **2008**, such as tendons, to assist in fixing soft tissue relative to the prosthesis **2000**, as one skilled in the art will understand.

Further, a prosthesis system **2050**, illustrated in FIG. **58**, can be provided to be more modular than the distal radial prosthesis **2000** and also includes various beneficial features and similar features to the prosthesis **2000**. With continuing reference to FIG. **58**, the modular flange distal radial prosthesis **2050** can include portions substantially similar to the distal radial prosthesis **2000**, illustrated and described above. Various similar portions will be mentioned briefly, but not described in detail.

The modular distal radial prosthesis **2050** can include a stem **2052** that can be provided in any appropriate length, cross-section or the like, such as those described above. Further, the modular distal radial prosthesis **2050** can include a bone replacement portion **2054**. The bone replacement portion **2054** can include portions or sections that are similar to the bone replacement portion **2004** discussed above. For example, the bone replacement portion **2054** can include an ulna articulation section **2056** and a carpal complex articulation section **2058**. It can also include projections **2055** to engage the radius **2**. As discussed above alternative projections, such as a projection section **2055'** can be provided with the bone replacement section **2054**. Also, a stem engaging portion **2055'*a*** can be provided in the projection section **2055'**. The projection **2055**, **2055'** can be any appropriate portion to engage the bone, including those taught above. As discussed above more than one projection section can be provided.

It will be understood that the articulation sections **2056**, **2058** can be similar to those described above or provided in any appropriate manner. Further, the bone replacement portion **2054** can be provided in any appropriate manner or of any appropriate material. For example, the bone replacement portion **2054** can include a height **2060** that can be variable or can be augmented with an augment section, such as the augment section described above. A plurality of the bone replacement portions **2054** can be provided in a kit, such as the kit **1059** in any appropriate size to be selected for a procedure, either pre- or intraoperatively. Also, the bone replacement portion **2054** can be formed of any appropriate material, such as a metal, metal alloy, polymer, pyrolytic carbon, or combinations thereof or composites thereof.

The modular distal radial implant **2050** can also include a modular flange section **2070**. The modular flange section **2070** can include a flange attachment portion **2072** and a flange attachment member **2074**. The flange attachment segments or members **2074** can be any appropriate member, such as a screw. The flange attachment member **2074** can include a threaded shank **2076** and a head **2078**. The head can define a drive section **2080**, such as an internal hex drive segment. It will be understood that the flange attachment member **2076** can be any appropriate member and can include appropriate threads, such as including a single thread through the head **2078** or include a second thread segment on the head **2078** to engage a selected portion of the modular flange **2070**.

The modular flange **2070** can also include a stabilization projection **2082** that can engage a portion of the bone replacement member **2054**. The stabilization section **2084** can be provided in any appropriate manner, such as to resist rotation of the modular flange **2070**, resist back out of the modular flange **2070**, or any appropriate reason. The stabilization section **2084** can be keyed to a configuration of the stabilization projection **2082**. The stabilization section **2084** can also be provided to allow for the movement of the flange **2080**, as discussed further herein. The interconnection of the modular flange **2070** with the bone replacement portion **2054** will be discussed in further detail herein, but can be provided to assist in positioning the modular flange **2070** relative to the bone replacement portion **2054** as a part of the prosthesis assembly system **2050**.

The modular flange **2070** can also include apertures **2090** to allow for passage of connection members, such as bone screws **2092**. The bone screw **2092** can include a threaded shank **2094** and a head **2096**, which can include an optional thread **2098**. The apertures **2090** can receive the screw **2092** to engage a bone portion, such as the radius **2** as described above. Therefore, the apertures **2090** can include internal threads **2100**, if selected. The internal thread **2100** can assist in reducing back out of the screw **2092**, increase interconnection of the screw **2092** with the modular flange **2070**, or other appropriate reasons. Further, the threads on the shank **2094** and the threads on the head **2098** can be the same, or different, such as a machine and a bone thread.

It will be understood that the modular flange **2070** can be provided in a plurality of lengths **2070**L, widths **2070**W, and thicknesses **2070**T. A selected modular flange **2070** can be provided or selected from the kit **1590**, or any other appropriate kit or stock, to be used with the prosthesis system **2050**. Therefore, the prosthesis system **2050** can be customized intraoperatively, preoperatively, or at any appropriate time. The prosthesis assembly **2050** can be used to replace a portion of the radius **2** for various reasons. Also, the flange **2070** can be interconnected to the bone replacement portion **2054** during a revision procedure.

With reference to FIG. **58**B, a prosthesis **2050'** similar to the prosthesis **2050** is illustrated, thus substantially similar portions will be referenced with the same reference numerals augmented by a prime. The prosthesis **2050'** can include a flange **2070'** that is formed as a "U" or "V" or other generally open shape or configuration. The open configuration can be provided for various reasons. For example, the connection bores **2090'** can be positioned a distance apart and/or away from a center line of the prosthesis **2050'**. Thus, the bone connection members **2092'** can easily pass the stem **2052'** during implantation of the prosthesis **2050'**.

In addition, the bone connection portals **2090**, **2090'** can be formed to allow the bone connection members to converge or diverge relative to the stem **2052**. One skilled in the art will understand that the direction of the bone connection members as they pass through the flange **2070**, **2070'**, **2006**, **2008** can be selected to be any appropriate angle and can be selected for various reasons. One skilled in the art will also understand that the angle of passage can be selected according to various embodiments and any particular embodiment is merely exemplary.

Turning reference to FIG. **59**B, the prosthesis according to various embodiments, such as the modular prosthesis **2050** can include selected portions. The flange **2070**, or a flange according to various embodiments, can include connection sections **2071**, which can be depressions or hollows in the flange **2070**. It will be understood that bores can also be formed in the flange **2070** to act as the connection sections **2071**. The connection sections **2071** can be used to capture or engage connection portions **2073**, such as cables. The connection portions **2073** can surround the bone **2** or other portions of the prosthesis **2050**, such as a second flange **2077**. The connection portions **2073** can compress selected portions for stability and healing or repair.

In addition, the second flange member **2077** can be provided as a part of the prosthesis **2050**. The second flange member **2077** can interconnect with a third flange member **2075** according to any appropriate connection mechanism, including those discussed above. Further, a bone connection member **2079** can be provided to interconnect the second flange member **2077** with the bone **2**. The second flange **2077** and the third flange **2075** can both be modular relative to the bone replacement portion **2054** or one or both the second flange **2077** and the third flange **2075** can be formed as a single member with the bone replacement member **2054**, combinations thereof. Thus, one skilled in the art will understand that multiple flanges can be provided relative to the bone replacement member **2054** to provide support to different or plural areas of the bone **2** or other portions of an anatomy. For example, the flange **2070** and the second flange **2077** can be provided substantially opposed to one another so that they can compress the bone **2** between them.

An exemplary method of implanting the prosthesis **2050** is illustrated in FIGS. **59**A and **59**B. The radius **2** can be resected according to any appropriate method, including those described above and illustrated in FIGS. **52-54**. The radius **2** can be prepared by resecting a selected portion of the radius **2**, such as a distal portion thereof by the selected distance **1612**. The resected distance **1612** can be replaced with the bone replacement portion **2054** of any appropriate height **2060**. The stem **2052** can be implanted in the radius **2** and interconnected with the bone replacement portion **2054** in any appropriate manner, such as with the taper, a thread, a locking pin, a locking screw, or any other appropriate interconnection. Although a selected portion of the distal radius **2** can be resected, the distal radius **2** may also include a fracture **2150** that is not resected or replaced with the bone replacement portion **2054**. The fracture **2150** can be stabilized, however, with use of the modular flange **2070** and the screws **2092** or other appropriate interconnection member.

The modular flange **2070** can be interconnected with the bone replacement portion **2054** using the connection member **2074**. The bone replacement portion **2054** can include a threaded bore **2152** that includes an internal thread **2154** that can interconnect or engage the threads of the connection member **2074**. As the connection member **2074** is driven, the modular flange **2070** can be moved in the direction of arrow **2160**.

Once the attachment member **2074** has moved the flange **2070** relative to the radius **2**, the interaction of the flange **2070** with the bone replacement portion **2054** and the stem **2052** can compress the radius **2** in an appropriate or selected manner. The compression of the flange **2070** against the radius **2** can assist in stabilizing the prosthesis **2050**, compressing the fracture **2150**, or be provided for any other appropriate reason. Further, the screws **2092** can be passed through the flange **2070** so that the shank **2094** can engage both a first side **2**A and a second side **2**B of the radius **2** and can span the fracture **2150**. By spanning the fracture **2150**, the fracture **2150** can be further compressed or stabilized. The compression of the fracture **2150** can assist in healing of the fracture, maintenance of the integrity of the radius **2**, or any other appropriate reason. It will be understood that any appropriate number of screws **2092** or lengths of the screws **2092** can be provided with the distal radial prosthesis assembly **2050**. Providing one screw is merely exemplary and provided for illustration purposes only.

Therefore, a modular flange, an integral flange, or a combination thereof can be provided for various purposes as illustrated in FIGS. **56** and **58**. The flange can be a part of the prosthesis assembly that can be integral or formed as a single piece with another portion of the prosthesis assembly or be provided as a completely separate member. Further, it will be understood that the prosthesis assembly, such as the distal radial prosthesis **2000** and **2050** can be provided for both an initial or primary and a revision procedure. For example, the flange can be interconnected with a bone, such as the radius **2**, at any appropriate time, such as during a second or revision procedure. Further, the various prosthesis assemblies can be used with modular flange portions to allow for installation of a flange member at a revision procedure. Thus, a completely one piece or modular system can be provided as selected.

A total wrist prosthesis assembly **2200**, illustrated in FIG. **60**, can be used to replace various portions of the anatomy. For example, a distal portion of the radius **2** can be resected and all or part of the carpal bones can be replaced. The total wrist prosthesis **2200**, therefore, can replace all or most of the carpal bones in the carpal complex or articulate relative to them. The total wrist prosthesis **2200**, however, can include multiple portions, as discussed further herein, such as a stem **2202**, bone replacement portion **2208**, articulation portion **2212**, carpal articulation portion **2220**, and a bearing plate implant portion **2240**.

As discussed above, the carpal implant can be affixed relative to selected portions of the carpal bones of a carpal complex after resecting and removing one or more of the bones in the carpal complex. The total wrist prosthesis **2200** can also be used for a total wrist prosthesis or in conversion of a hemi-wrist prosthesis to a complete wrist prosthesis. As discussed above, a hemi-wrist prosthesis can be used to replace a selected portion of the wrist, such as the distal radius or a portion of carpal complex, without replacing both sides of the articulating portion.

The various portions of the total wrist prosthesis **2200** can include the stem member **2202** that can be positioned in the radius **2**. The stem member **2202** can include a connection portion **2204**, which can be threaded to engage a matingly threaded portion **2222**. The stem member **2202** can include a stem portion **2206** that extends into the radius **2**. The stem portion **2206** can be provided in any appropriate configuration such as an I-Beam, cylindrical, or the like. Various configurations can assist in reducing rotation or reducing the possibility of rotation of the stem within the radius **2**. Further, the stem can be formed from any appropriate material such as titanium, an alloy of cobalt chromium, an alloy of cobalt chromium and molybdenum, stainless steels, or any appropriate biologically compatible materials.

The body or bone replacement portion **2208** can be provided to be positioned at the distal end of the radius **2**. The distal end or resected end of the radius **2** can be resected in any appropriate manner to engage or contact the body **2208**. The body **2208** can include a passage or throughbore **2210** to allow for the connection portion **2204** of the stem **2202** to pass through and engage the articulation portion or member **2212**. The body **2208** can also include a second passage or throughbore **2214** to allow for a connection portion or member **2216** to pass therethrough and also engage the articulating member **2212**.

The articulation member **2212** can define an articulation or moving surface **2218**. The articulation surface **2218** can be provided to articulate with a selected portion of the anatomy or the second prosthesis, such as the carpal prosthesis **2220**. The articulation surface **2218** can also include a second or bone articulation surface **2218*a***. Extending proximally from the articulation member **2212** can be an engagement or connecting portion. A stem connection portion **2222** can include a mating thread to engage the threads **2204** of the stem. A second connection portion **2224** can also include mating threads to engage the screw **2216**. The various connection portions can also be provided to mate with the body **2208** to allow for substantially tight tolerances once they are connected. Also the connection portions **2222** and **2224** can allow for a single keyed or unique connection and configuration of the articulation portion **2212**, bone replacement portion **2208**, and the stem member **2202**. It will be understood that such keying is not required, but can be provided for various purposes (e.g. assembly efficiency and implant efficiency).

The radial portion of the total wrist prosthesis **2200** can generally include the stem **2202**, the screw **2216**, the body **2208**, and the articulation member **2212**. According to various embodiments, the body **2208** can be formed of a substantially solid and non-porous metal, a porous metal, a porous coated metal. As illustrated in FIG. **60**, a body **2208'**, according to various embodiments, can be formed of or include a porous surface. The porous surface of the body **2208'** can assist with fixation of the body **2208'** to the anatomy, such as the radius **2**. It will be understood that over time, after implantation of the body **2208'**, the distal end of the radius **2** can grow into the porous surface of the porous body **2208'**. The porous portion of the body **2208'** can include a porous coating; a porous metal portion (e.g. Regenerex™ Porous Titanium Construct sold by Biomet Manufacturing Corp.); porous metal portions disclosed in U.S. patent application Ser. No. 11/357,868, entitled “Method And Apparatus For Use Of Porous Implants” and in U.S. patent application Ser. No. 11/546,500, entitled “Method And Apparatus For Use Of Porous Implants”, both of these are incorporated herein by reference; or other appropriate porous portions. The body **2208**, **2208'** can also be appropriately formed of U.H.M.W.P.E., ceramics, pyrolitic carbon, plastic, or polymers.

Further, the articulation member **2212** can also be formed of a metal or substantially hard material such as the same materials that form the body **2208**. Therefore, the portions of the radial portion of the prosthesis **2200** can be formed substantially of a metal or other appropriate hard materials. Various metals can include titanium, stainless steels, alloys such as cobalt, chromium and molybdenum alloys, or any appropriate metals. The various metal portions can assist in a fracture treating prosthesis. It will be further understood, the radial portion of the prosthesis **2200** can be any appropriate prosthesis, such as those described above. Further, the various portions of the radial portion of the prosthesis **2200** can be assembled prior to implanting them into the radius **2**.

The prosthesis **2200** can also include the carpal complex prosthesis **2220**. With continuing reference to FIG. **60** and additional reference to FIG. **61**, the carpal complex prosthesis **2220** can be formed as a single unit from modular components. For example, an articulation or bearing portion **2230** can be molded onto or around an insert member **2232**. The insert member **2232** can include one or more protrusions **2234** that can engage a portion of the bearing portion **2230** to hold it securely relative to the metal insert portion **2232**.

The bearing portion **2230** can be formed of any appropriate material such as polyethylene, high molecular weight polyethylene, ceramics, for example, the materials that can be used to form the body **2208** or any appropriate material. Generally, the bearing portion **2230** can be formed of a material that can and is formed to articulate with the articulation surface **2218** of the articulation member **2212**. As discussed above, the articulation member **2212** can be formed of a metal, thus the bearing portion **2230** can be formed of a polymer, plastic, ceramic, pyrocarbon (also referred to as pyrolytic carbon), or other appropriate material for articulating with the articulation member **2212** after implantation.

The metal insert **2232** can define a mating portion **2236** to mate with a complementary mating portion **2238** of a carpal implant member **2240**. The carpal implant member **2240** can include a surface or portion **2242** that engages or is positioned next to one or more of the carpal bones in the carpal complex. The carpal prosthesis **2240** can be interconnected with the metal insert, such that the bearing member **2230** acts as a bearing portion for the carpal complex when articulating with the articulation member **2212** of the prosthesis **2200**. Therefore, the radial portion of the prosthesis **2200** can be formed or include a metal material as the articulation portion **2212** and articulate with a polymer or similar material that forms the articulation bearing **2230**.

It will be understood that the carpal bearing portion **2220** can be used with an appropriate prosthesis, including those discussed above. The carpal bearing portion **2220** can include the polymer or similar bearing member **2230** to articulate with a substantially hard, although smooth, articulation member. Further, it will be understood, that the carpal articulation or bearing portion **2220** can be used to assist in converting a hemi-prosthesis to a full prosthesis.

The attachment portion **2236** can be any appropriate attachment portion such as a mating locking taper, threaded, an adhesive, a receptacle or portion, or any appropriate connecting portion. Further, the body **2208** can be provided in a kit, including the kits discussed above, to provide or include a plurality of heights. A height **2208***h* of the body **2208** can be selected based upon the amount of material to be resected from the radius **2**. The portion of the radius **2** to be resected can depend upon the amount of fracture, disease, or the like of the radius **2** and, therefore, can be patient specific. Nevertheless, a kit can include a plurality of the bodies **2208** to allow for a substantially customized assembly and prosthesis during the procedure or intra-operatively.

As briefly described above, the various distal radial implant assemblies or members can be used in either a hemi-arthroplasty or a complete or total arthroplasty. For example, the distal radial implant assemblies **1500**, **2000**, **2050**, etc. can be used to simply replace a distal portion of the radius **2**. In this manner, a hemi-arthroplasty of the wrist can occur, which allows for maintenance of substantially the entire carpal complex. Alternatively, a substantial total wrist arthroplasty can be performed. In the total wrist arthroplasty, not only can a portion of the radius be replaced, but a portion of the carpal complex **6** can also be replaced with a selected implant or prosthesis. Therefore, it will be understood that any of the implants discussed above are not limited to either a total or a complete arthroplasty and can be provided in various combinations to allow for hemi-arthroplasty or a total arthroplasty. Further, the various implant portions can be selected to be altered during a revision procedure to allow for an alteration or changing of a hemi-arthroplasty to a total arthroplasty.

Alternatively, the carpal bearing portion **56** can also be provided to interconnect or replace a portion of the carpal complex. For example, the connection portion **2238** can be interconnected with the taper or connection portion **124**. The connection portion **2238** can be utilized in either a complete or a hemi wrist arthroplasty. Also, if a radial implant is provided during a hemi-arthroplasty procedure and later a total wrist arthroplasty is selected, the bearing portion **2220** can be selected for implantation. In this manner the kit, such as the kit discussed above, can include both the bearing portion **56** and the bearing portion **2220**, and any appropriate bearing member.

The various bearing portions **56**, **2220** allow for selection intra-operatively or pre-operatively for performing a procedure. For example, providing both of the bearing components allows for the selection of a soft bearing or articulation surface or a hard articulation or bearing surface. Also, the selection can be made intra-operatively based upon various considerations, such as experience of a surgeon. Also, if a metal or hard radial implant is provided during a first or primary procedure, during a revision procedure (which can occur after the primary procedure is complete) the carpal portion **2220** can be provided to move against the hard radial component.

Referring now to FIG. **62**, an exemplary embodiment of a wrist prosthesis system **2300** is illustrated. As will be discussed, the system **2300** can replace at least a portion of various bones and other tissue within a patient's wrist including the forearm, the wrist joint, and/or the carpal complex as will be discussed in greater detail below. Furthermore, the system **2300** can be configured to replicate natural, anatomical motion of the patient's wrist.

Generally, the system **2300** can include a radial implant **2302** with a bone replacement member **2304** and a stem **2306**. The system **2300** can also include a carpal implant **2308** that is operably coupled to the radial implant **2302**. More specifically, the carpal implant **2308** can be pivotably coupled to the radial implant **2302** by a dome-shaped wrist bearing component **2310** in some embodiments. It will be appreciated by those of ordinary skill in the art that the components of the system **2300** can include similar features to any one of the embodiments discussed hereinabove, some of which are reiterated hereinbelow. The system **2300** can also have features discussed hereinbelow that are different from the embodiments discussed above.

As shown in FIG. **62**, the carpal implant **2308** can include a base **2312**. The base **2312** can be a curved plate and can be disposed on a proximal end of the hand similar to the carpal implant **54** shown in FIG. **2** or any other related embodiments described hereinabove.

The carpal implant **2308** can also include a plurality of separately attachable augments **2314***a*, **2314***b*, **2314***c*. The augments **2314***a*, **2314***b*, **2314***c* can be shaped according to one or more carpal bones within the carpal complex **6**. As will be discussed, the augments **2314***a*, **2314***b*, **2314***c* each replace at least a portion of a carpal bone within the carpal complex **6**. Also, as will be discussed, the augments **2314***a*, **2314***b*, **2314***c* are each removably coupled to the base **2312**. As such, the carpal implant **2308** can be modular in nature and can be modified according to the patient's existing anatomy and the like. It will be appreciated that the carpal implant **2308** can include any number of augments without departing from the scope of the present disclosure. Moreover, while three augments **2314***a*, **2314***b*, **2314***c* are illustrated as attached to the base **2312**, any number of augments can be separately attached.

More specifically, the augment **2314***a* can be a solid member and can include a mating face **2316***a* that abuttingly mates with the base **2312**. The augment **2314***a* can also include a plurality of articulation surfaces **2318***a* on which adjacent members can articulate. For instance, the surrounding metacarpals can articulate on the articulation surfaces **2318***a*. Also, in some embodiments, the augment **2314***b* can articulate on the articulation surface **2318***a* of the augment **2314***a*. It will be appreciated, however, that the augment **2314***a* could be fused (i.e., fixed) to any surrounding members without departing from the scope of the present disclosure. The augment **2314***a* can also include various features for attaching anatomical tissue and the like. The augment **2314***a* can replace the lunate, hamate, and triquetrum bones **10**, **12** (see FIG. **1**) of the patient.

The augment **2314***b* can also include a mating face **2316***b* and a plurality of articulation surfaces **2318***b*. Because of the shape of the augment **2314***b*, the augment **2314***b* can replace the capitate bone **20** (see FIG. **1**).

Likewise, the augment **2314***c* can include a mating face **2316***c* and a plurality of articulation surfaces **2318***c*. Because of the shape of the augment **2314***c*, the augment **2314***c* can replace the scaphoid bone **28** (see FIG. **1**).

It will be appreciated that the augments **2314***a-c* can replace any suitable bone of the carpal complex **6**. For instance, in some embodiments, the augments **2314***a-c* can replace one or more complete bones of the proximal row in the carpal complex **6** (i.e., the scaphoid **8**, lunate **10**, triquetrum **12**, and/or pisiform **14** bones). In other embodiments, the augments **2314***a-c* can replace one or more complete bones of the distal row in the carpal complex **6** (i.e., the trapezium **16**, trapezoid **18**, capitate **20**, and/or hamate **22** bones). In still other embodiments, the augments **2314***a-c* can replace complete bones in both the proximal and distal row in the carpal complex **6**. The augments **2314***a-c* can also replace only a portion of a specific bone within the carpal complex **6**.

The augments **2314***a-c* can be removably coupled to the base **2312** in any suitable fashion. For instance, in some embodiments, the carpal implant **2308** includes one or more fasteners **2320***a*, **2320***c* for this purpose. More specifically, the carpal implant **2308** can include a fastener **2320***a*, which extends through the base **2312** and the augment **2314***a* and also into the fourth metacarpal **2322***a*. Accordingly, the fastener **2320***a* can secure the augment **2314***a* between the base **2312** and the fourth metacarpal **2322***a* to secure the augment **2314***a* within the carpal complex **6**. Likewise, the carpal implant **2308** can include a fastener **2320***c*, which extends through the base **2312** and the augment **2314***c* and also into the second metacarpal **2322***c*. Accordingly, the fastener **2320***c* can secure the augment **2314***c* between the base **2312** and the second metacarpal **2322***c* to secure the augment **2314***c* within the carpal complex **6**. Furthermore, the carpal implant **2308** can include a stem **2324**, which can extend from the base **2312**, through the augment **2314***b*, and into the third metacarpal **2322***b*. Accordingly, the stem **2324** can secure the augment **2314***b* between the base **2312** and the third metacarpal **2322***b* to secure the augment **2314***b* within the carpal complex **6**. It will be appreciated that the length, width, threading, and/or other features of the fasteners **2320***a*, **2320***c* and the stem **2324** can be adjusted based upon the patient's anatomy, based on any deterioration of the patient's anatomy, based upon the judgment of the surgeon, etc. for ensuring adequate fixation of the carpal implant **2308**.

It will be appreciated that the augments **2314***a-c* can be removably coupled to the base **2312** in any other suitable fashion in addition to or instead of the fasteners **2320***a*, **2320***c* and stem **2324**. For instance, as shown in FIG. **70**, the base **2312'** can include a frusto-conical projection **2326'**, and the augment **2314'** can include a frusto-conical recess **2328'** that receives the projection **2326'**. The projection **2326'** and recess **2328'** can each be correspondingly tapered such that the projection **2326'** and recess **2328'** comprise a taper lock coupling **2330'** (i.e., Morse taper) for removably coupling the augment **2314'** and the base **2312'**.

Also, as shown in FIG. **71**, the base **2312"** can include a cylindrical projection **2326"** with an enlarged rim **2332"**. The augment **2314"** can also include a cylindrical recess **2328"** that receives the projection **2326"**, and the recess **2328"** can include a pocket **2334"** that receives the enlarged rim **2332"**. Accordingly, the projection **2326"** and recess **2328"** comprise a dovetail coupling **2336"** for removably coupling the augment **2314"** and the base **2312"**.

Moreover, as shown in FIG. **72**, the augment **2314'"** can include a cylindrical projection **2326'"** with an enlarged rim **2332'"**. The base **2312'"** can also include a cylindrical recess **2328'"** that receives the projection **2326'"**, and the recess **2328'"** can include an undercut portion **2338'"** that receives the rim **2332'"**. A resilient ring **2340'"** can also be included, and the ring **2340'"** can surround the projection **2326'"** and be disposed in the undercut portion **2338'"**. The ring **2340'"** can retain the projection **2326'"** within the recess **2328'"**. Accordingly, the projection **2326'"**, recess **2328'"**, and ring **2340'"** can comprise a ring lock coupling **2342'"** for removably coupling the augment **2314'"** and the base **2312'"**.

Additionally, it will be appreciated that the individual augments **2314***a-c* can be interconnected together using fasteners, taper lock couplings **2326'**, dovetail couplings **2336"**, ring lock couplings **2342'"**, or any other suitable means without departing from the scope of the present disclosure. Furthermore, it will be appreciated that at least some of the augments **2314***a-c* can be integrally coupled to the base **2312** and/or the other augments **2314***a-c* can be removably coupled without departing from the scope of the present disclosure.

The augments **2314***a-c* and base **2312** can include and be manufactured from any suitable materials. For instance, the augments **2314***a-c* and the base **2312** can include and be manufactured from cobalt-chromium-molybdenum (CoCrMo), polyetheretherketone (PEEK), including carbon fiber reinforced PEEK, titanium, stainless steel or other biocompatible material.

Thus, to use the carpal implant **2308** of the wrist prosthesis system **2300** shown in FIG. **62**, the surgeon can select the augments **2314***a-c* for implantation within the patient. More specifically, the surgeon can determine (e.g., by X-ray or other imaging procedures) which bones of the patient's carpal complex **6** need to be replaced. Then, the surgeon can entirely remove those bones from the patient and use the selected augments **2314***a-c* to replace the removed bones.

Also, a modular kit can be provided having the same augments **2314***a-c* in a wide variety of sizes, materials, etc. As such, the surgeon can select the augments **2314***a-c* for implantation to closely match the patient's anatomy, to provide desired material properties, etc. Moreover, the surgeon can select a base **2312** for implantation in a similar fashion. For instance, a modular kit can include a wide variety of bases **2312** that vary in size, materials, etc. Once selected, the base **2312** and augments **2314***a-c* can be removably coupled as discussed above and implanted. It will be appreciated that the carpal implant **2308** advantageously allows the surgeon to vary the carpal implant **2308** in a number of ways so that the carpal implant **2308** can be tailored to a specific patient. Furthermore, the augments **2314***a-c* can completely replace a bone within the carpal complex **6**, which can be very useful for patients with a high degree of bone degeneration, damage, etc.

Referring now to FIGS. **62** and **63**, the bone replacement member **2304** of the radial implant **2302** will now be discussed in greater detail. As shown in FIG. **62**, the bone replacement member **2304** can be coupled to a resected, distal end of the radius **2** similar to the embodiments discussed hereinabove.

As shown in FIGS. **62** and **63**, the bone replacement member **2304** has an axis X. The bone replacement member **2304** can include a proximal portion **2350** and a distal portion **2352** that is removably coupled to the proximal portion **2350**. As shown in FIG. **63**, the proximal portion **2350** can include a disc-shaped proximal end **2354**, a hollow cylindrical outer wall **2356**, and a cylindrical inner projection **2358**. The distal portion **2352** can include a distal end **2360**, a hollow cylindrical outer wall **2362**, and a cylindrical inner projection **2364**.

As shown in FIG. **63**, the inner projection **2364** of the distal portion **2352** can include a tapered projection **2366**. Also, the inner projection **2358** of the proximal portion **2350** can include a tapered recess **2368** that receives the projection **2366** when the proximal and distal portions **2350**, **2352** are coupled. As shown in FIG. **62**, the projection **2358** and the recess **2368** can be tapered so as to comprise a taper lock coupling **2369** (i.e., Morse taper); however, it will be appreciated that the distal and proximal portions **2352**, **2350** can be coupled in any other suitable fashion, such as a dovetail coupling, fasteners, a ring lock coupling, and the like. Furthermore, when the proximal and distal portions **2350**, **2352** are coupled, a rim **2370** of the outer wall **2356** can mate against a rim **2372** of the outer wall **2362**. Additionally, the distal portion **2352** can include a projection **2374**, which projects generally parallel to the axis X away from the rim **2372**, and the proximal portion **2350** can include a recess **2376** in the rim **2370** that receives the projection **2374** to limit relative rotation of the proximal and distal portions **2350**, **2352** about the axis X.

As shown in FIG. **63**, the inner projections **2358**, **2364** are spaced apart from the respective outer wall **2356**, **2362**. Thus, as shown in FIG. **62**, the proximal and distal portions **2350**, **2352** cooperate to define an annular pocket **2378** encapsulated within the bone replacement member **2304** when the proximal and distal portions **2350**, **2352** are removably coupled. It will be appreciated that the pocket **2378** can have any suitable shape. It will also be appreciated that the proximal and distal portions **2350**, **2352** can be coupled so as to hermetically seal the pocket **2378**. It will also be appreciated that the system **2300** can include a separate sealing member (not shown) for hermetically sealing the pocket **2378**.

Accordingly, because the bone replacement member **2304** includes the pocket **2378**, the weight of the bone replacement member **2304** can be advantageously reduced. Furthermore, the proximal and distal portions **2350**, **2352** can be made of different materials for further weight reduction. For instance, the proximal portion **2350** can be made of titanium while the distal portion **2352** can be made of CoCr.

Furthermore, the system **2300** can include a variety of modular proximal and distal portions **2350**, **2352** having different sizes, materials, etc. Accordingly, the bone replacement member **2304** can be highly variable and tailored according to the particular patient. Also, in some embodiments, only one of the proximal and distal portions **2350**, **2352** is modular and includes a wide variety of sizes, while the other comes in a single size.

As shown in FIGS. **62** and **63**, the proximal end **2354** of the proximal portion **2350** can abut the resected end of the radius **2** of the patient. Also, the proximal end **2354** can include projections **2377** that project in a generally transverse direction away from the axis X. The projections **2377** can extend into the cortical region of the radius **2** for further securement of the bone replacement member **2304** to the radius **2**.

Furthermore, as shown in FIG. **63**, the distal end **2360** of the distal portion **2352** can include an articulation surface **2380**. The bearing component **2310** can articulate on the articulation surface **2380**. It will be appreciated that the bone replacement member **2304** can also include an ulna articulation section (not specifically shown) on which the ulna **4** can articulate. The ulna articulation section can be similar to the ulna articulation section **2010**, **2058** of the embodiments shown in FIGS. **56-58**B. In some embodiments, the bone replacement member **2304** can also include carpal articulation surfaces (not specifically shown) on which bones of the carpal complex **6** or on which the carpal implant **2308** can articulate.

Referring now to FIG. **64**, an alternative embodiment of the bone replacement member **2304'** will be discussed. As shown, the bone replacement member **2304'** includes a first portion **2382'** and a second portion **2384'**. The first portion **2382'** can include a head **2386'**, which is generally disk shaped. The head **2386'** can include the articulation surface **2380'**. The first portion **2382'** can also include a stem **2388'**, which is elongate and extends from the head **2386'** in a direction generally parallel with the axis X. The stem **2388'** can include a threaded bore **2390'**, which can threadably receive the stem **2306** (FIG. **62**). In addition, the stem **2388'** can include an enlarged rim **2392'** on an end of the stem **2388'** opposite from the head **2386'**. The rim **2392'** extends in a direction generally transverse from the axis X.

Moreover, the second portion **2384'** can include a generally cylindrical body **2394'** having an axis generally parallel to the axis X and a flange **2396'** that is elongate and that extends generally parallel to the axis X. The body **2394'** can surround the stem **2388'** of the first portion **2382'**. The flange **2396'** is spaced apart from the axis of the stem **2388'**. The flange **2396'** can be shaped generally similar to the flanges **2006**, **2070**, **2070'** of the embodiments shown in FIGS. **56**, **57**, **58**A, **58**B, **59**A, **59**B. As such, when the bone replacement member **2304'** is coupled to the radius **2**, the flange **2396'** can be disposed outside of the radius **2** and can inhibit rotation of the bone replacement member **2304'** about the axis X.

The first portion **2382'** and the second portion **2384'** of the bone replacement member **2304'** can be made of different materials. For instance, the first portion **2382'** can be made out of a first material, such as a metallic material, and the second portion **2384'** can be made out of a second material, such as a polymeric material. Further still, the first portion **2382'** can be made out of CoCr, and the second portion **2384'** can be made out of PEEK, including carbon fiber reinforced PEEK. However, it will be appreciated that the first and second portions **2382'**, **2384'** can be made out of any suitable materials.

In some embodiments, the second portion **2384'** can be molded to the first portion **2382'** for coupling the first and second portions **2382'**, **2384'**. However, the first and second portions **2382'**, **2384'** can be coupled in any suitable fashion.

Referring now to FIG. **65**, another embodiment of the bone replacement member **2304"** will be discussed. Similar to the embodiment of FIG. **64**, the bone replacement member **2304"** can include a first and second portion **2382"**, **2384"**. However, the first portion **2382"** can include a head **2386"**, a stem **2388"**, as well as an integrally coupled base **2398"**. The threaded bore **2390"** and the flange **2396"** can be included on the base **2398"**. Also, the stem **2388"** can include one or more projections **2399"** that project transversely away from the axis X. In some embodiments, the projections **2399"** have a T-shaped cross-section; however, the projections **2399"** can have any suitable shape. The second portion **2384"** can surround the stem **2388"**, and the projections **2399"** can increase the surface area of the first portion **2382"** to ensure secure bonding of the second portion **2384"** to the first portion **2382"**.

Referring now to FIG. **66**, another embodiment of the bone replacement member **2304'"** will be discussed. The bone replacement member **2304'"** is substantially similar to the embodiment of FIG. **65**; however, as shown in FIG. **66** the base **2398'"** can be removably coupled to the stem **2388'"**. For instance, the base **2398'"** can include a recess **2402'"** that receives the stem **2388'"**. In some embodiments, the base **2398'"** and the stem **2388'"** can be threadably attached. Moreover, in the embodiment of FIG. **66**, the second portion **2384'"** can be removably coupled to the stem **2388'"**. For instance, the second portion **2384'"** can slide over the stem **2388'"**, and the base **2398'"** can then be coupled to the stem **2388'"**. Accordingly, the second portion **2384'"** can be retained on the bone replacement member **2304'"** between the head **2382'"** and the base **2398'"**. Furthermore, in some embodiments, the bone replacement member **2304'"** can include a fastener **2400'"**, such as a lock washer, a locking nut, and the like, which further retains the second portion **2384'"** on the stem **2388'"**. Additionally, as shown in FIG. **67**, the longitudinal cross-section of the stem **2388'"** can have a cross-sectional shape or an inhibiting mechanism that inhibits rotation of the second portion **2384'"** about the axis X. For instance, the stem

2388''' can have a rectangular cross-section as shown in FIG. **67**. However, the stem **2388'''** can have any other suitable shape, such as a star, a cross, and the like to inhibit rotation of the second portion **2384'''** about the axis X. In other embodiments, the stem **2388'''** can be knurled (not shown) in order to inhibit rotation of the section portion **2384'''** about the axis X.

It will be appreciated that the embodiments of the bone replacement member **2304'**, **2304''**, **2304''** shown in FIGS. **64-67** can have a reduced weight. This is because a significant portion of the bone replacement member **2304'**, **2304''**, **2304'''** can be made out of a lightweight polymeric material, such as PEEK including carbon fiber reinforced PEEK. However, the bone replacement member **2304'**, **2304''**, **2304'''** can still ensure proper articulation and attachment to surrounding members. Additionally, the bone replacement member **2304'**, **2304''**, **2304'''** can resist excessive wear due to the materials therein. Also, the bone replacement member **2304'**, **2304''**, **2304'''** can increase manufacturability because only a portion of the bone replacement member **2304'**, **2304''**, **2304'''** need be machined while other portions can be molded.

Now, referring to FIGS. **62** and **63**, the stem **2306** will be discussed in greater detail. As shown in FIG. **62**, the stem **2306** can include a proximal portion **2410** and a distal portion **2412**. As shown, the distal portion **2412** can be coupled to the bone replacement member **2304**, **2304'**, **2304''**, **2304'''** in any suitable fashion, such as by a threaded joint. The proximal portion **2410** can be fixedly coupled to the radius **2**. As will be discussed, the proximal and distal portions **2410**, **2412** of the stem **2306** can be movably coupled to each other to bias or pull the bone replacement member **2304** in a proximal direction.

For instance, the proximal and distal portions **2410**, **2412** can each be generally elongate and at least partially hollow. The proximal and distal portions **2410**, **2412** can be aligned with each other generally parallel to the axis X.

Furthermore, a biasing member **2414**, such as a helical, compression spring, a compliant member, or any other suitable biasing member, can be housed within the stem **2306** and coupled between the proximal and distal portions **2410**, **2412**. For instance, a proximal end **2416** (FIG. **62**) of the biasing member **2414** can be fixedly coupled to the interior of the proximal portion **2410**. Also, as shown in FIG. **68**, a distal end **2418** of the biasing member **2414** can be fixedly coupled to a rod **2420** that is disposed within the distal portion **2410**, extending transverse to the axis X. The rod **2420** can received within a slot **2422** defined within the distal portion **2412** of the stem **2306**.

In addition, the stem **2306** can include a seal member **2424** (FIG. **62**), which extends between and seals any gap between the proximal and distal portions **2410**, **2412** of the stem **2306** to limit intrusion of foreign matter within the interior of the stem **2306** through the slot **2422**. It will be appreciated that the seal member **2424** can also cover and seal the slot **2422** from outside the stem **2306**. The seal member **2424** can be resilient to maintain a seal despite relative movement between the proximal and distal portions **2410**, **2412**.

Thus, when implanting the stem, the proximal portion **2410** of the stem **2306** can be fixedly coupled to the radius **2** of the patient. The proximal portion **2410** can be fixed via bone cement, fasteners, and the like. Then, a tool (not shown), such as a screwdriver or other suitable tool, can extend along the axis X along the interior of the distal portion **2412** to operably couple to the rod **2420**. By rotating the rod **2420** with the tool about the axis X, the rod **2420** can advance within the slot **2422**, thereby changing the length and, thus, the spring force of the biasing member **2414**. For instance, the slot **2422** can include a first end **2426**, which is closer to the distal portion **2410**, and a second end **2428** which is further away from the distal portion **2410**. Thus, if the rod **2420** is disposed generally toward the first end **2426**, the rod **2420** can be rotated about the axis X to move within the slot **2422** toward the second end **2428**. By advancing the rod **2420**, the rod **2420** lengthens the biasing member **2414** and increases the compressive force supplied thereby. Accordingly, the distal portion **2412** is biased and pulled in a proximal direction toward the proximal portion **2410** of the stem **2306**. Accordingly, the stem **2306** can provide a biasing force, which biases the bone replacement member **2304** in a proximal direction to enhance fixation of the bone replacement member **2304** to the radius **2** of the patient and provide loading to the underlying bone.

Referring now to FIG. **69**, another embodiment of the stem **2306'** is shown. As shown, the distal portion **2412'** of the stem **2306** includes an interior channel **2430'** that extends generally parallel to the axis X. Also, the proximal portion **2410'** includes a threaded bore **2432'** that is generally aligned with the channel **2430'**. Moreover, the stem **2306'** includes a fastener **2434'** that extends out of the channel **2430'** and into the bore **2432'**. The fastener **2434'** can be of any suitable type, such as a threaded bolt or screw. Thus, to implant the stem **2306**, the proximal portion **2410'** of the stem **2306'** can be fixedly coupled to the radius **2** of the patient. Then, a tool **2436'** can be inserted within the channel **2430'** and used to threadably advance the fastener **2434** within the bore **2432'** to pull the distal portion **2412'** and, thus, the bone replacement member **2304** proximately toward the proximal portion **2410'** of the stem **2306**. The fastener **2434'** can have deformable threads, which deform as the fastener **2434'** advances within the bore **2432'** to thereby lock the fastener **2434'** within the bore **2432'**. Also, the distal portion **2412'** can have a tapered projection **2438'** which is received within a tapered recess **2440** of the proximal portion **2410'** to reinforce the joint between the proximal and distal portions **2410'**, **2412'**.

Accordingly, while the description includes various embodiments as illustrated in the drawings, it will be understood by those skilled in the art that various changes may be made and equivalents may be substituted for elements thereof without departing from the scope of the description or the appended claims. In addition, many modifications can be made to adapt a particular situation or material to the teachings without departing from the scope thereof. Therefore, it is intended that the teachings are not limited to any various embodiment illustrated in the drawings and described in the specification as the best mode presently contemplated for carrying out the teachings herein, but that the teachings will include any various embodiments falling within the foregoing teachings and the appended claims.

What is claimed is:

1. A wrist prosthesis system to replace at least a portion of a bone of a wrist of a patient, comprising:

- a radial implant with a bone replacement member configured to replace at least a portion of a radius of the patient, the radial implant also including a stem configured to extend into the radius of the patient;
- a carpal implant that is operably coupled to the radial implant, the carpal implant including a base having first and second intersecting planar portions, one of the planar portions defining an aperture configured to annularly surround a portion of the radial implant, and an augment configured to replace at least a portion of a carpal bone of a carpal complex of the patient, the augment being removably and directly coupled to the base and the radial implant; and

wherein one of the base and the augment includes a projection and the other of the base and the augment includes a recess that receives the projection to removably couple the base and the augment.

2. The wrist prosthesis system of claim **1**, wherein the augment is shaped to completely replace at least one carpal bone of the carpal complex of the patient.

3. The wrist prosthesis system of claim **2**, wherein the augment is shaped to completely replace at least one of a scaphoid bone, a lunate bone, a triquetrum bone, and a capitate bone.

4. The wrist prosthesis system of claim **1**, wherein the augment has an articulation surface for articulation against an adjacent member.

5. The wrist prosthesis system of claim **1**, wherein the bone replacement member includes a metallic portion and a polymeric portion that is operatively coupled to the metallic portion.

6. The wrist prosthesis system of claim **1**, wherein the carpal implant includes a plurality of an augments each shaped to replace at least one carpal bone of the carpal complex of the patient.

7. A wrist prosthesis system to replace at least a portion of a bone of a wrist of a patient, comprising: a radial implant with a bone replacement member configured to replace at least a portion of a radius of the patient, the radial implant also including a stem configured to extend into the radius of the patient; a carpal implant that is operably coupled to the radial implant, the carpal implant including a base having first and second intersecting planar portions, one of the planar portions defining an aperture configured to annularly surround a portion of the radial implant, and an augment configured to replace at least a portion of a carpal bone of a carpal complex of the patient, the augment being removably and directly coupled to the base and the radial implant.

a fastener that removably couples the base and the augment.

8. A wrist prosthesis system to replace at least a portion of a bone of a wrist of a patient, comprising: a radial implant with a bone replacement member configured to replace at least a portion of a radius of the patient, the radial implant also including a stem configured to extend into the radius of the patient; a carpal implant that is operably coupled to the radial implant, the carpal implant including a base having first and second intersecting planar portions, one of the planar portions defining an aperture configured to annularly surround a portion of the radial implant, and an augment configured to replace at least a portion of a carpal bone of a carpal complex of the patient, the augment being removably and directly coupled to the base and the radial implant.

wherein the bone replacement member includes a proximal portion that is operably coupled to the stem and a distal portion that is removably coupled to the proximal portion, the proximal and distal portions cooperating to define a pocket encapsulated within the bone replacement member when the proximal and distal portions are removably coupled.

9. The wrist prosthesis system of claim **8**, wherein the bone replacement member defines an axis, wherein one of the proximal and distal portions includes a projection, and wherein the other of the proximal and distal portions includes a recess that receives the projection to limit relative rotation of the proximal and distal portions relative to the axis.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 8,105,389 B2
APPLICATION NO. : 12/389919
DATED : January 31, 2012
INVENTOR(S) : Brian K. Berelsman et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 2, line 45, “implant;” should be -- “implant,” --

Column 4, line 64, delete “and” after “invention”

Column 4, line 66, “FIG. 26.” should be -- FIG. 26; --

Column 5, line 19, insert -- the -- after “of”

Column 5, line 50, “invention.” should be -- invention; --

Column 5, line 58, “a end” should be -- an end --

Column 7, line 33, “a ulnar” should be -- an ulnar --

Column 8, line 7, “required. The” should be -- required, the --

Column 8, line 10, delete “.” after “58”

Column 10, line 23, “a ulnar” should be -- an ulnar --

Column 10, line 46, delete “a” after “providing”

Column 13, line 59, “compliment” should be -- complement --

Column 14, line 6, “compliments” should be -- complements --

Column 14, lines 11-12, “compliments” should be -- complements --

Column 14, line 20, “compliment” should be -- complement --

Column 14, line 29, insert -- to -- after “parallel”

Column 16, line 34-35, “For examples” should be -- For example --

Column 21, line 39, insert -- . -- after “1204c”

Column 21, line 48, “me be” should be -- may be --

Column 22, line 39, “include a” should be -- include an --

Column 23, line 9, “of a” should be -- of an --

Column 24, line 59, delete “,” after “length”

Column 25, line 8, “such as physician” should be -- such as a physician --

Signed and Sealed this
Seventh Day of August, 2012

David J. Kappos

David J. Kappos
Director of the United States Patent and Trademark Office

Column 26, line 38, “to as not to” should be -- so as not to --

Column 27, line 45, delete “an” before “articulating”

Column 28, line 27, “substantial” should be -- substantially --

Column 30, line 16, “bound” should be -- bind --

Column 31, line 18, insert -- . -- after “1500”

Column 31, line 48, “than” should be -- that --

Column 32, line 64, delete “,” after “Although”

Column 32, line 65, insert -- , -- after “member”

Column 33, line 11, delete “to” after “can”

Column 33, line 28, delete “,” after “height”

Column 33, line 32, “implant” should be -- implants --

Column 34, line 23, “on skilled” should be -- one skilled --

Column 35, line 29, “87'” should be -- 80' --

Column 38, line 40, delete “a” after “with”

Column 39, line 15, “in clued” should be -- include --

Column 40, line 9, “manners” should be -- manner --

Column 42, line 14, insert -- , -- after “above”

Column 42, line 20, insert -- , -- after “above”

Column 42, line 30, “kit 1059” should be -- kit 1590 --

Column 43, line 36, “flange” should be -- flanges --

Column 43, line 63, insert -- of -- after “both”

Column 43, line 66, insert -- or -- before “combinations”

Column 53, line 8, second occurrence of “2304''” should be -- 2304''' --

Column 53, line 45, insert -- be -- after “can”

Column 55, line 21, delete “an” after “of”